Nature–Based Outdoor Recreation Trends and Futures

Idaho Conference on Outdoor Recreation and Tourism
Lewiston ID, May 3 – 5, 2011

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This presentation is all about change

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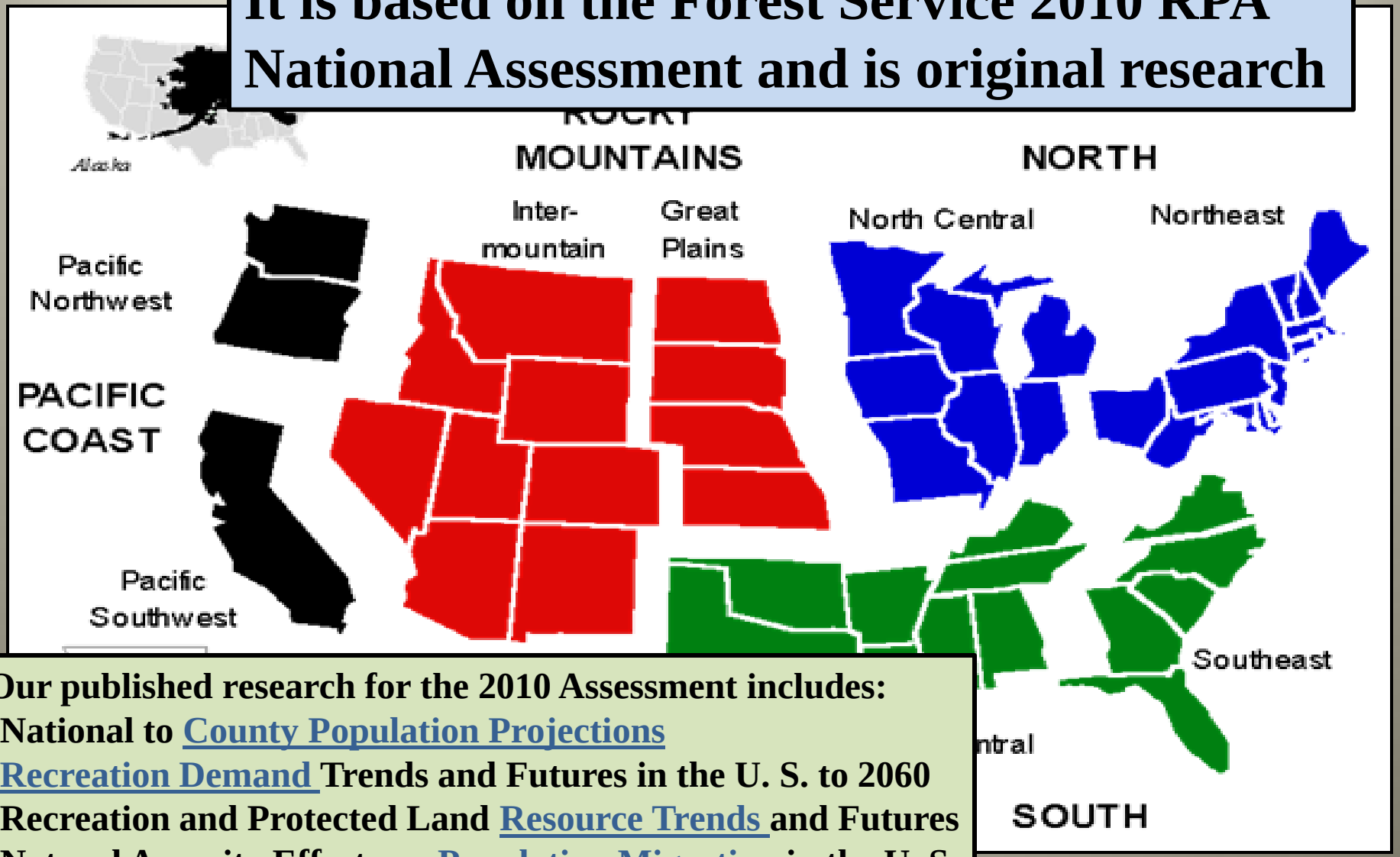
Forest Service RPA Regions of the U. S.

It is based on the Forest Service 2010 RPA National Assessment and is original research



Our published research for the 2010 Assessment includes:

- **National to County Population Projections**
- **Recreation Demand Trends and Futures in the U. S. to 2060**
- **Recreation and Protected Land Resource Trends and Futures**
- **Natural Amenity Effects on Population Migration in the U. S.**

Trend Summaries

- Population and demographics
- Visitation to public lands
- Outdoor recreation participation trends
- Kids time outdoors
- Forecasts of future outdoor recreation
- The draw of natural amenities and rural population growth

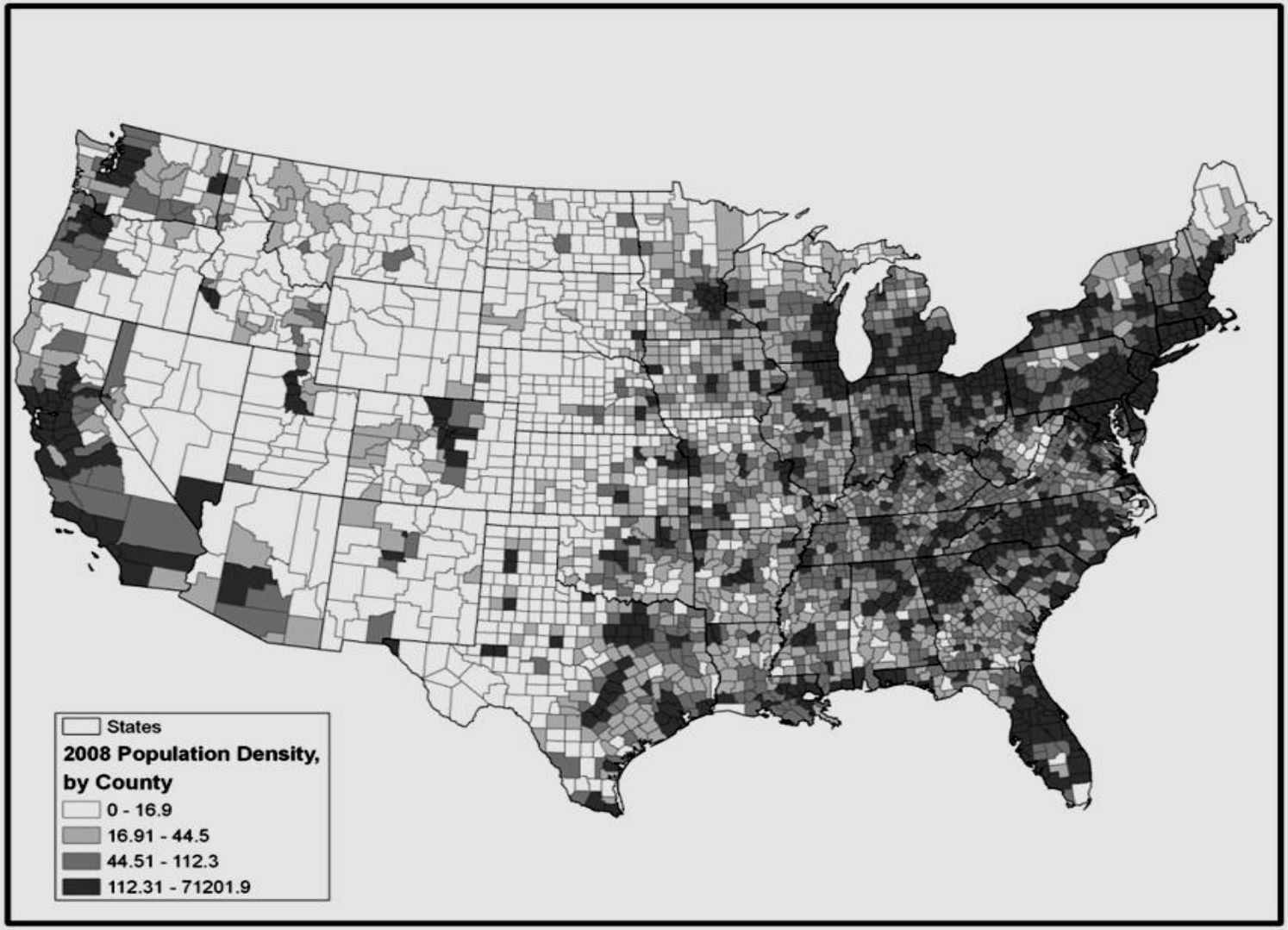
Population and Demographic Change

- **What is happening with population growth and are there increasing concentrations in some places (persons per square mile)?**
- **Is the age distribution of the U. S. population changing and which age groups are growing or shrinking?**
- **How has the race/ethnic make-up of the U. S. population been changing over the last 20 years?**

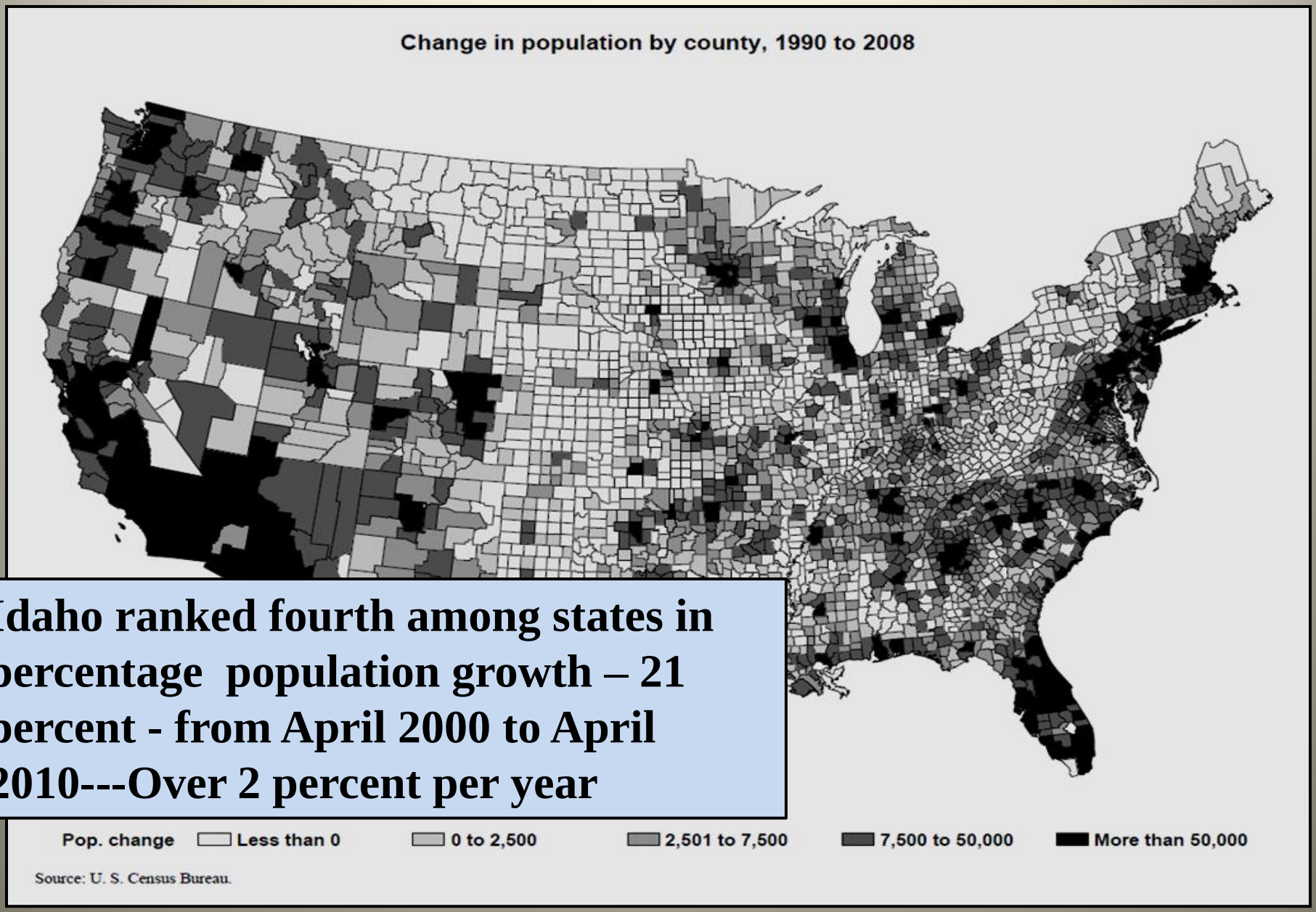
RPA is unique in that it Tracks Trends and Forecasts Futures

Region & Sub-Region	Total population	
	Population	Percent of National
Northeast	63,245.9	20.8
North Central	61,122.0	20.1
North Total	124,368.0	40.9
Southeast	49,485.4	16.3
South Central	53,320.2	17.5
South Total	102,805.6	33.8
Great Plains	6,031.2	2.0
Intermountain	**21,729.6**	**7.1**
Rocky Mountains Total	**27,760.9**	**9.1**
Alaska	683.2	0.2
Pacific Northwest	10,339.3	3.4
Pacific Southwest	38,044.9	12.5
Pacific Coast Total	49,067.4	16.1
U. S. Total	304,001.8	100.0

Persons per square mile (current)



Population growth by county since 1990



Idaho ranked fourth among states in percentage population growth – 21 percent - from April 2000 to April 2010---Over 2 percent per year

2008 population by region and age group with percent change since 1990 (Population is in 1,000s)

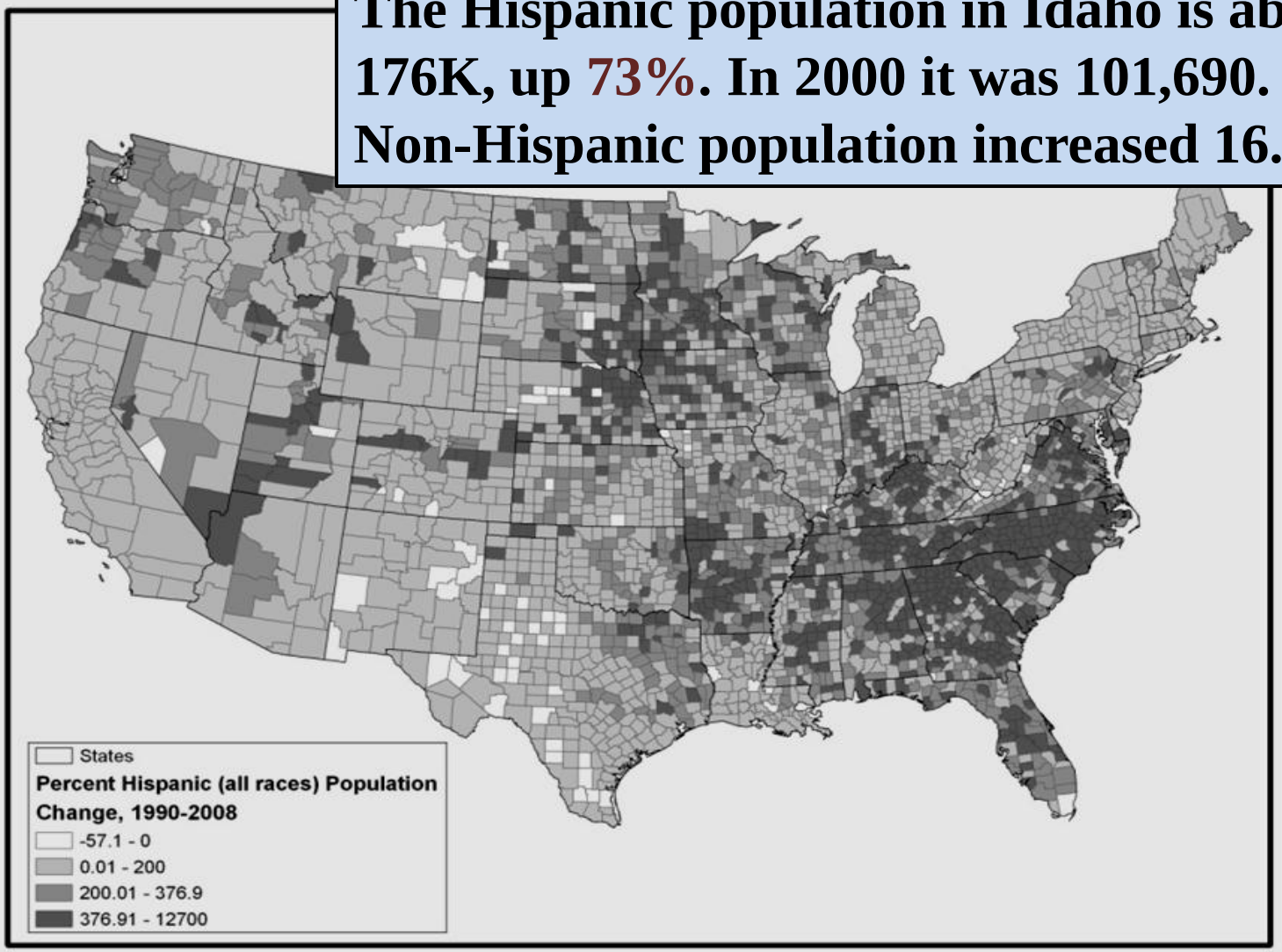
Age Group	Rocky Mountains	% change	United States	% change
Under 6	2,555.8	37.7	25,082.3	12.0
Age 6-10	1,941.7	24.1	19,897.3	10.2
Age 11-15	1,897.9	34.5	20,346.1	21.5
Age 16-24	3,544.3	41.8	38,373.4	13.8
Age 25-34	3,965.7	22.7	40,931.6	-5.2
Age 35-44	3,679.9	28.7	42,501.1	13.5
Age 44-54	3,861.1	111.2	44,372.1	77.0
Age 55-64	2,989.5	96.1	33,686.2	59.5
Age 65+	3,379.6	48.6	38,869.7	25.0
Total	27,815.7	46.0	304,059	22.2

Current population by region and by race/ethnicity with percent change since 1990 (population is in 1,000s)

Race/ Ethnicity	Rocky Mountains	% change	United States	% change
White	19,479.6	25.3	199,491.5	5.9
African American	952.9	69.4	37,171.8	26.8
American Indian	768.9	38.3	2,329.0	29.6
Asian or Pacific Islander	690.5	171.1	13,672.3	95.4
Hispanic	5,497.2	157.8	46,943.6	109.8
U. S. All Races	27,815.7	46.0	304,059.7	22.2
2 or more races	426.6	.	4,451.7	.

Percent change in Hispanic population since 1990

The Hispanic population in Idaho is about 176K, up 73%. In 2000 it was 101,690. Non-Hispanic population increased 16.7%



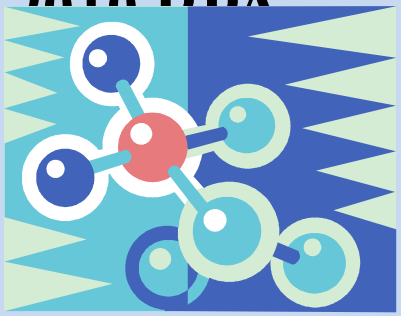
Population and Demographic Change

- **Growth (population per square mile) has occurred almost everywhere, especially the Northeast coast, the Southern Appalachians, Atlanta, Chicago, Denver, Salt Lake City, the Southwest, Portland and Seattle**
- **The fastest growing age has been ages 44-54 and 55-64, with next fastest being 65 or older. There has been a decline in age group 25-34**
- **Growing especially fast is the Hispanic population in the Southeastern states, states bordering the Mississippi River, the upper Mid-West, Arizona, Utah, Wyoming, coastal Oregon and Washington, and Idaho**

- **Changing population and its demographics have affected outdoor recreation trends**

How Have Demographics Affected Outdoor Recreation Participation? (Current RPA Research)

- Models developed for forecasting for the 2010 RPA
  - Black (neg)
  - Native Amer. (pos)
  - Asian (neg)
  - Hisp (neg) – except for Day Hiking
  - Educ (neg) – consumptive & motor activities
  - Educ (pos) – nonconsumptive
  - Income (pos) – most activities
  - Gender – (pos) boys still play more outside
  - Population density (neg) – crowding or urban effect?
  - Resource availability (positive)
    - Land, forests, open space, water, etc.



Bowker, et al, RPA in press

Outdoor Recreation Participation Trends

- **Is use of public land up, down, what?**
- **How do peoples' choices for outdoor recreation compare with previous generations, and is there an overriding trend**
- **What is the general trend for nature-based recreation, is it growth?**
- **Have any traditional activities shown decline (e.g., hunting).**
- **If nature-based outdoor recreation is growing, are there activities and interests that stand out?**

What about visitation to public lands?

Federal Lands (3 UP, 1 Steady, 1 Down)

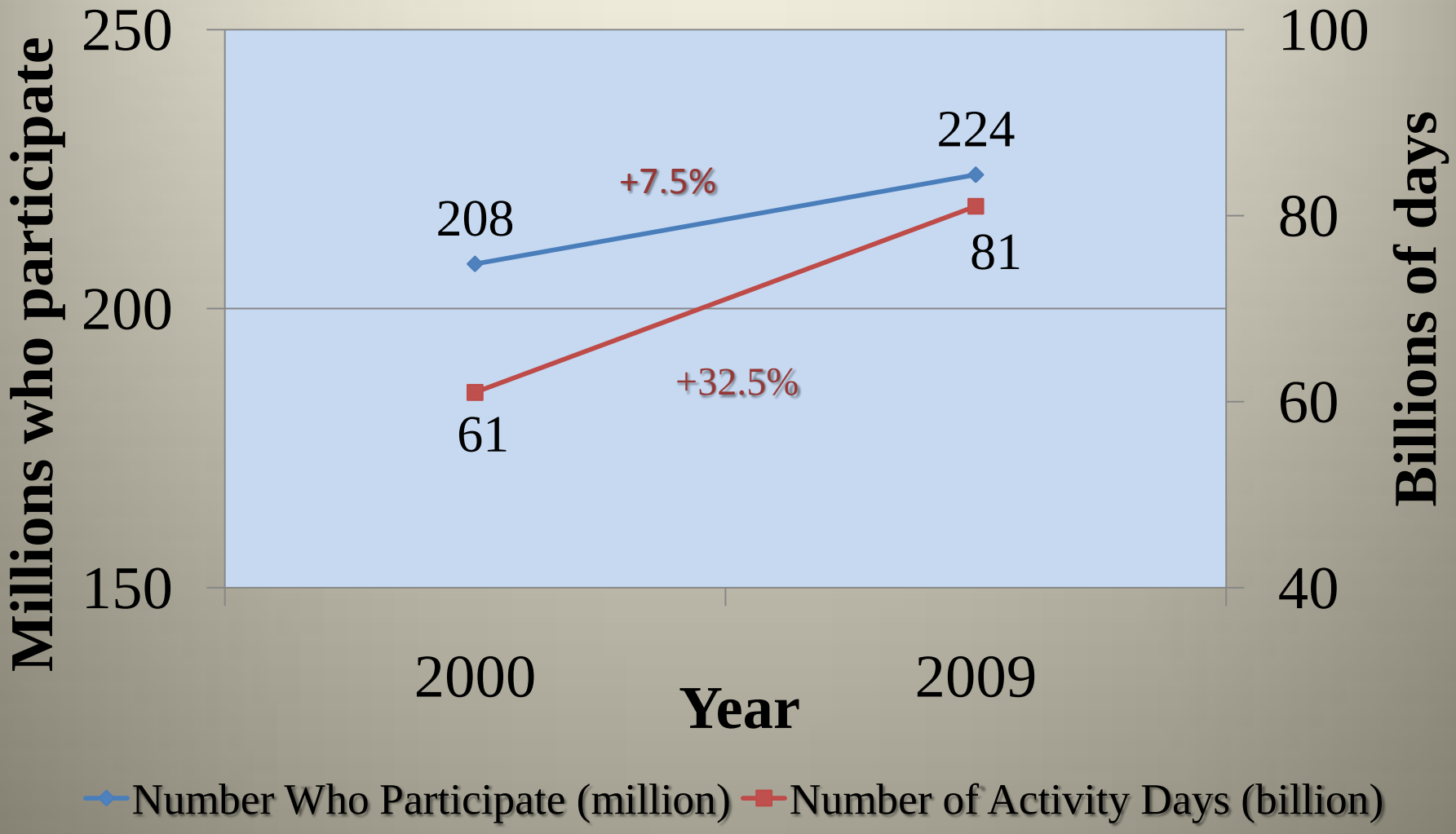
Year	NPS	F&WS	BLM	USFS	Corps
1996	266	30	57	-----	372
2000	286	37	54	-----	-----
2004	277	40	54	205	359
2008	275	41	57	176	357
2009	286	43	57	174	370

What about visitation to public lands?

State Park Systems/ Rocky Mountain Region

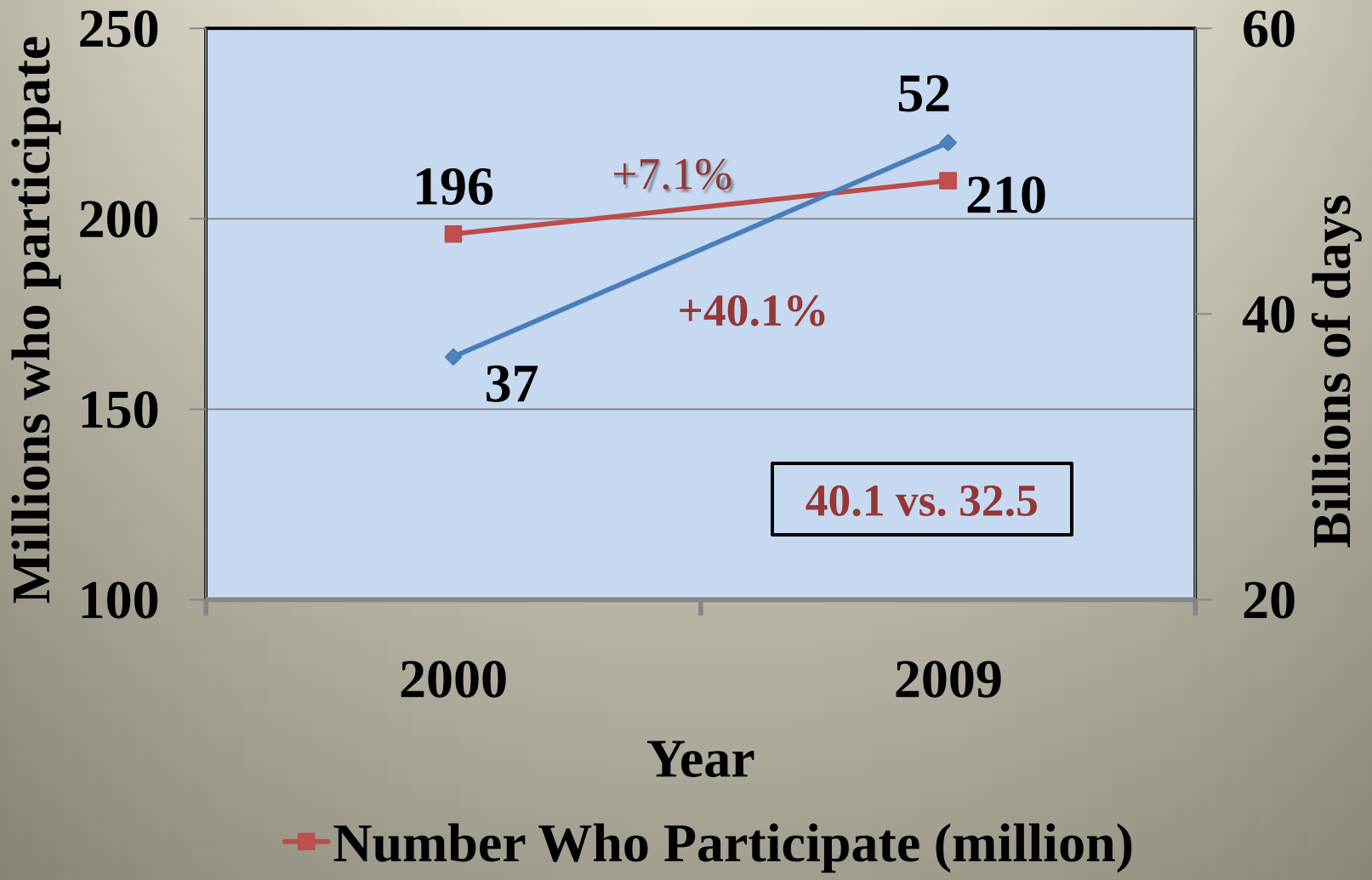
- 1992 49.0
- 1995 58.9
- 2000 58.9
- 2005 62.9
- 2009 64.3

General outdoor recreation demand growth by people age 16+ (number of people and annual participation days), 2000–2009.



Source: National Survey on Recreation and the Environment (NSRE)

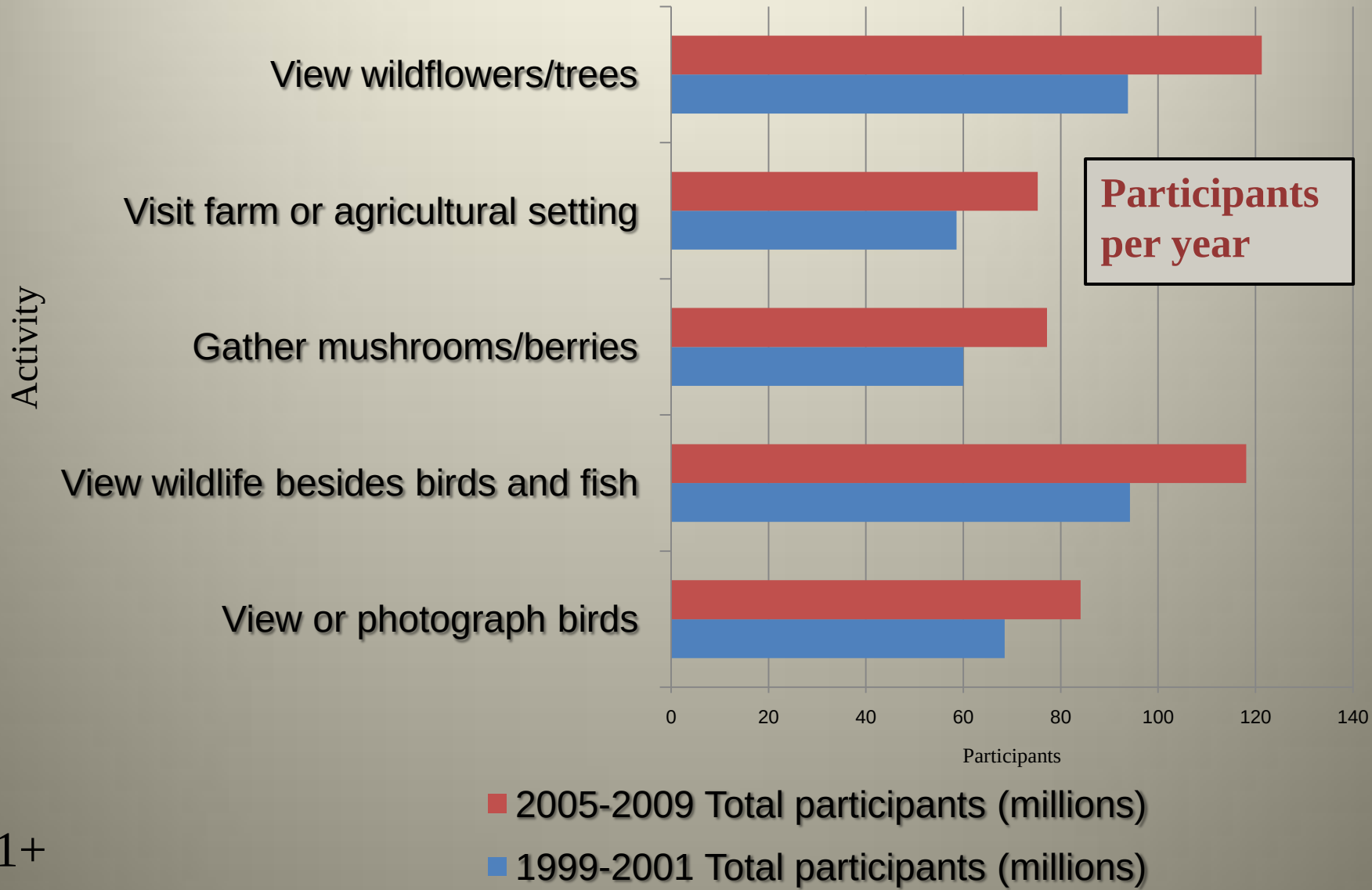
Nature-based outdoor recreation growth (number of people and annual participation days, 2000–2009



P45+

Activity	1999-2001	2005-2009	2005-2009	1999-2001 to 2005-2009
		Total participants		
Walk for pleasure	……..	175.6	200.0	85.0	13.9
Gathering of family/friends	128.2	157.6	174.2	74.0	10.5
Gardening/landscaping for pleasure	--	140.8	157.9	67.1	12.1
View natural scenery	--	127.1	149.8	63.7	17.9
Visit outdoor nature center/zoo	110.9	121.0	133.3	56.6	10.2
Sightseeing	117.5	109.0	123.9	52.7	13.7
Picnicking	112.1	118.3	121.6	51.7	2.8
View wildflowers/trees	--	93.8	121.3	51.6	29.4
Driving for pleasure	--	107.9	120.5	51.2	11.6
View wildlife besides birds and fish	62.8	94.2	118.1	50.2	25.4
Visit historic sites/monuments	91.6	96.1	103.9	44.1	8.1
Visit a beach	128.8	84.4	102.0	43.3	20.7
Swimming in lakes, streams, etc.	87.4	85.5	97.5	41.5	14.0
Bicycling	77.8	81.9	88.3	37.5	7.8
View or photograph birds	54.3	68.5	84.1	35.7	22.8
Day hiking	53.5	69.1	79.7	33.9	15.4
Visit a wilderness	--	67.2	79.1	33.6	17.7
Gather mushrooms/berries	--	60.0	77.2	32.8	28.6
Visit farm or agricultural setting	--	58.6	75.3	32.0	28.6
View salt/freshwater fish	27.6	52.3	63.5	27.0	21.4
Visit waterside besides beach	--	53.2	56.5	24.0	6.3
Developed camping	46.5	55.3	56.0	23.8	1.1
Warmwater fishing	49.3	47.6	55.7	23.7	17.1
Motorboating	59.5	50.7	55.0	23.4	8.6

Four of the top five fastest growing activities between periods 1999-2001 and 2005-09 were nature based



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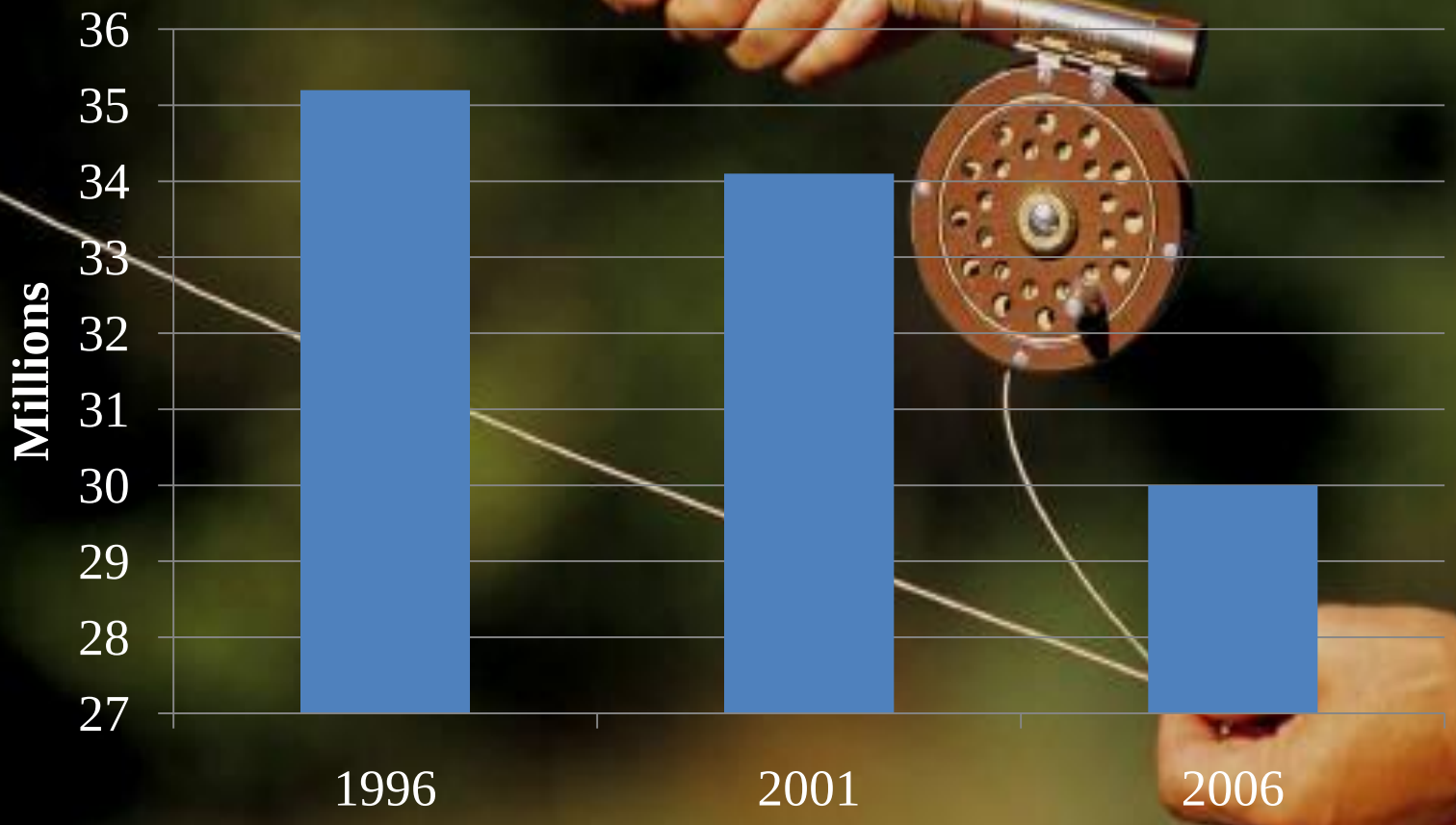
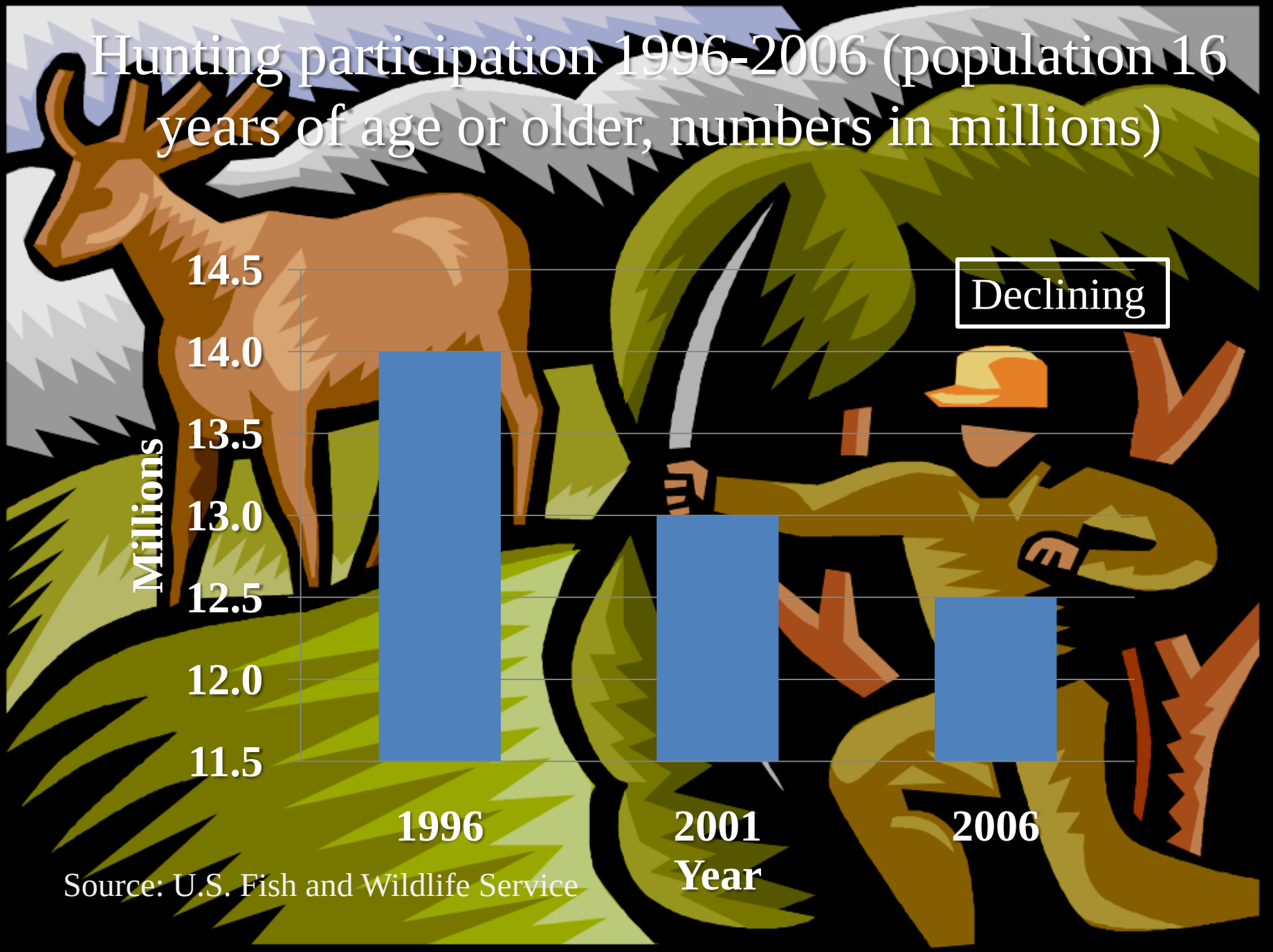
Fishing participation: 1996 to 2006 (population 16 years of age or older, numbers in millions)



Source: U.S. Fish and Wildlife Service

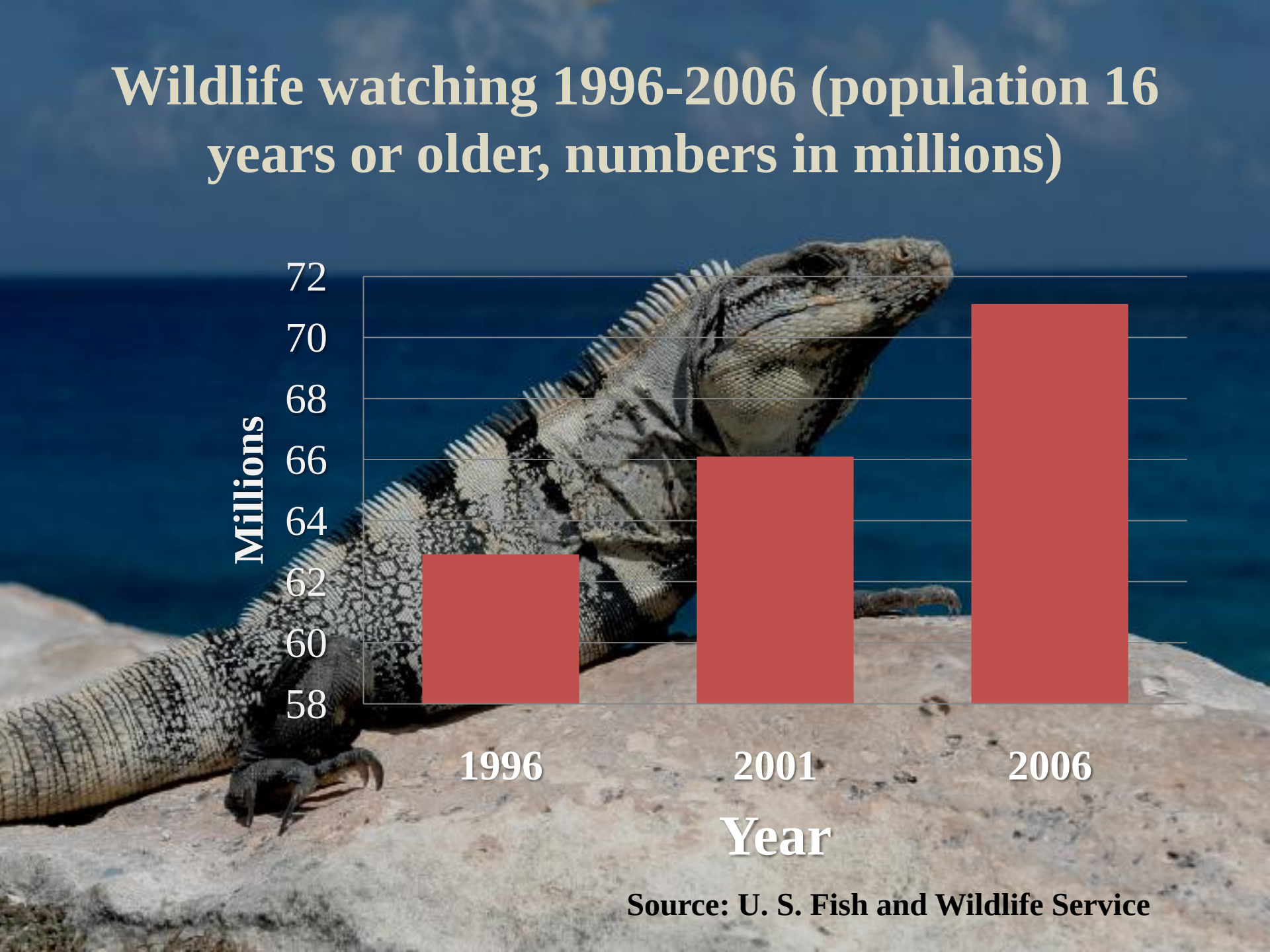
Declining

Hunting participation 1996-2006 (population 16 years of age or older, numbers in millions)



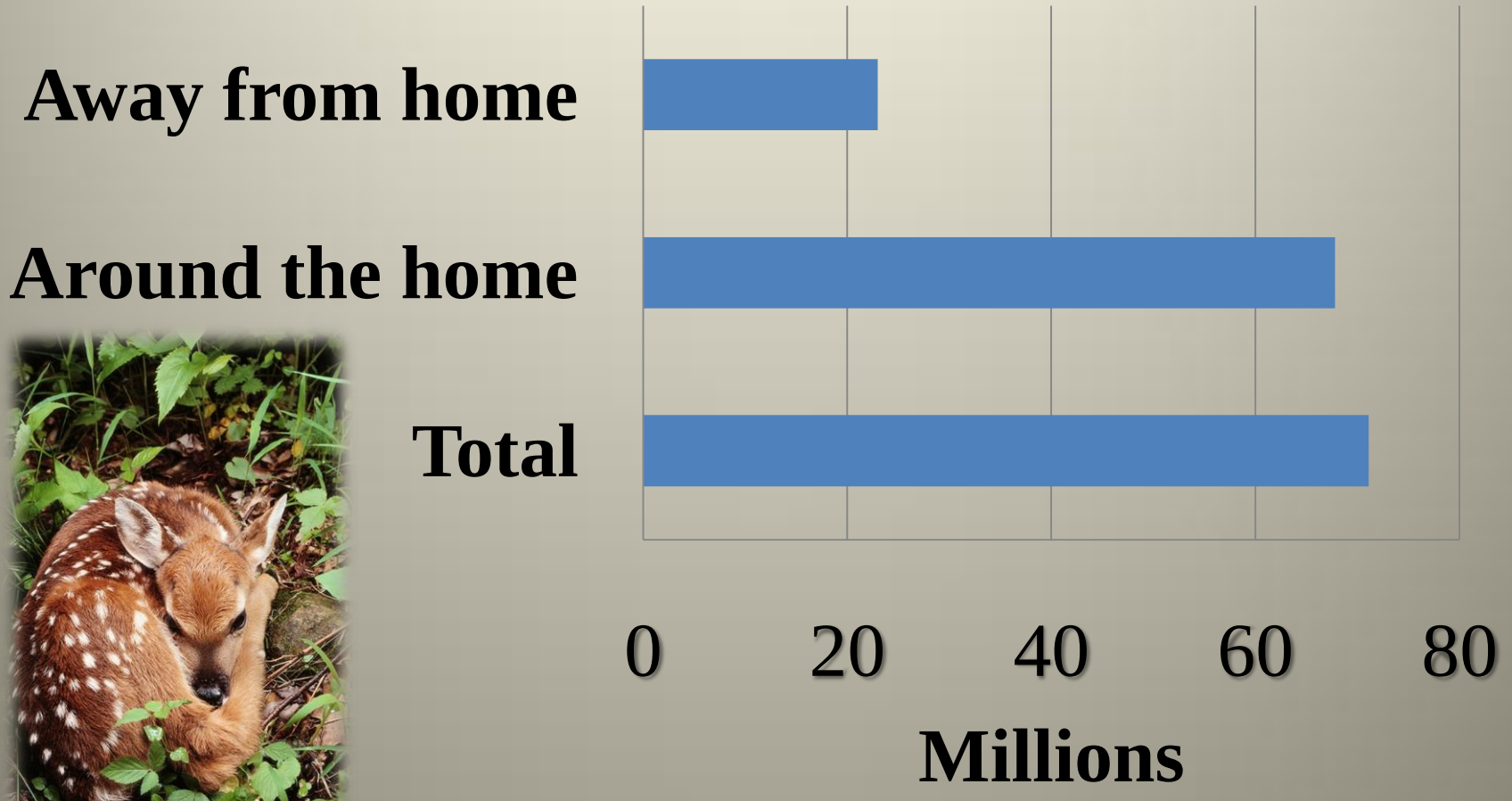
Source: U.S. Fish and Wildlife Service

Wildlife watching 1996-2006 (population 16 years or older, numbers in millions)



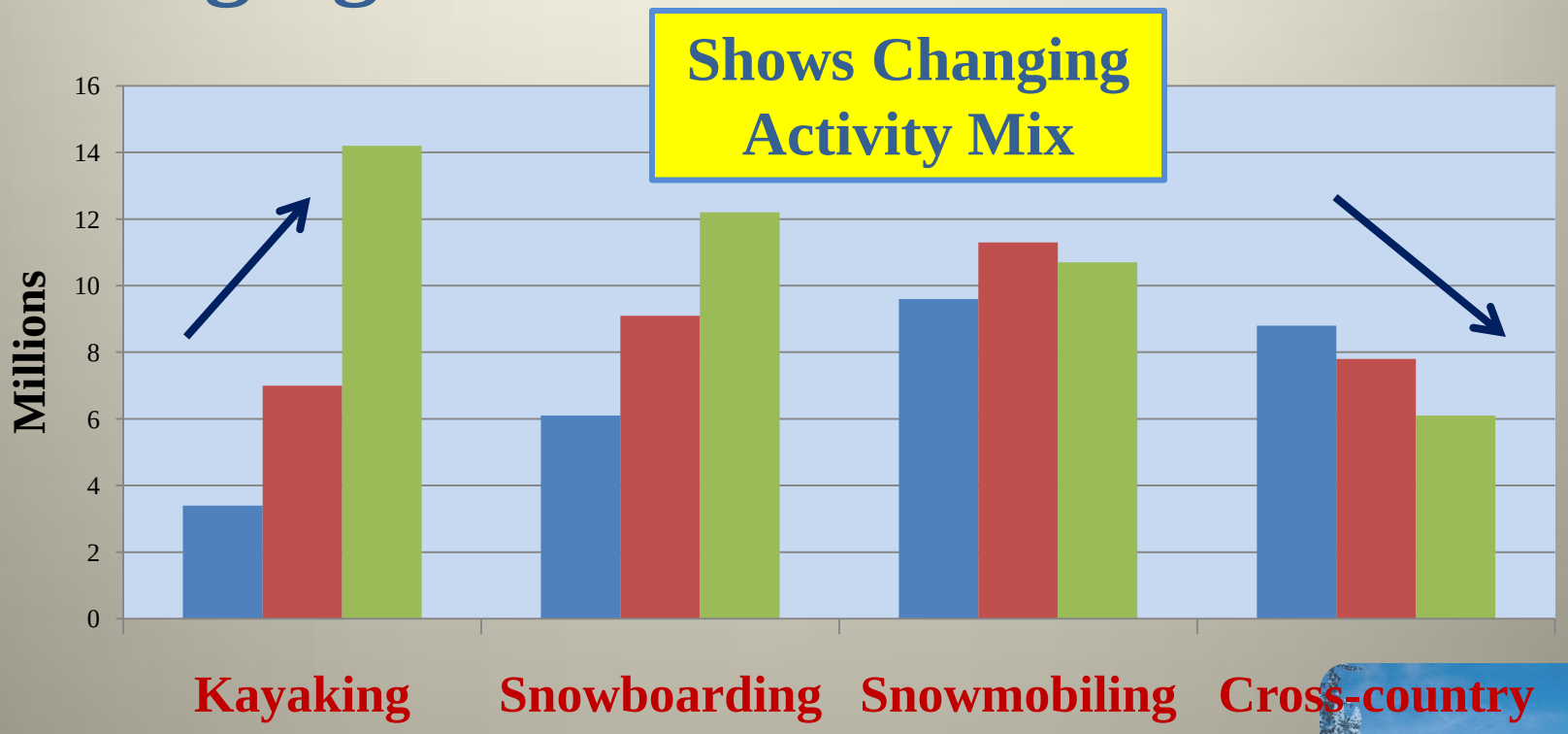
Source: U. S. Fish and Wildlife Service

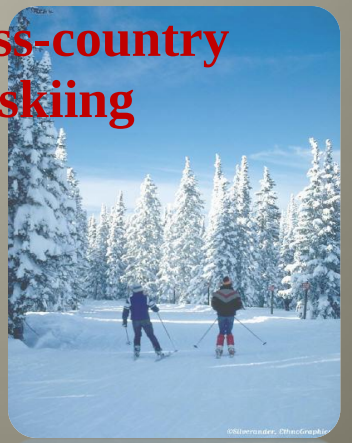
Wildlife watching in 2006 (population 16 years of age or older, numbers in millions)



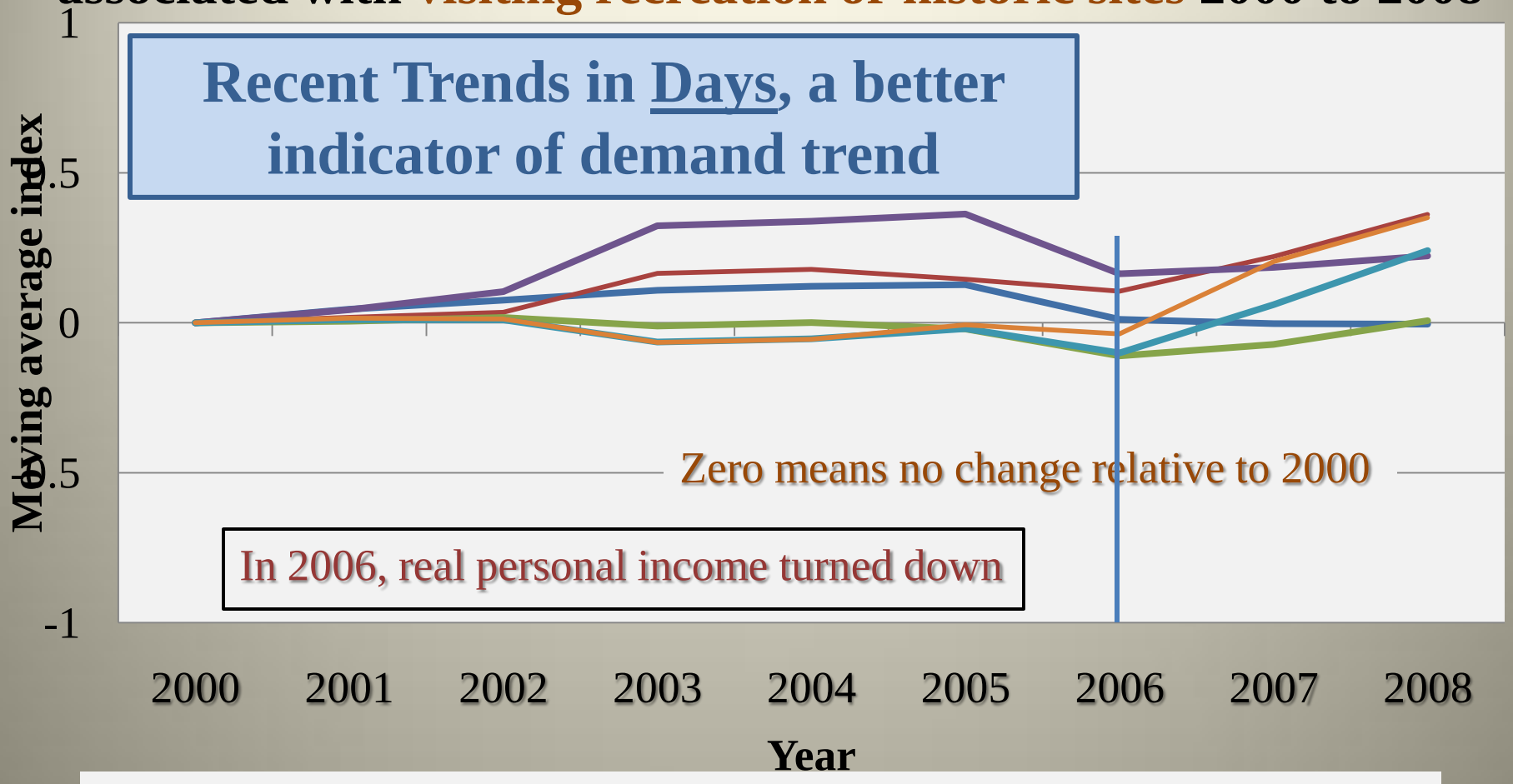
Source: U. S. Fish and Wildlife Service

Trend for four activities to illustrate changing outdoor recreation choices

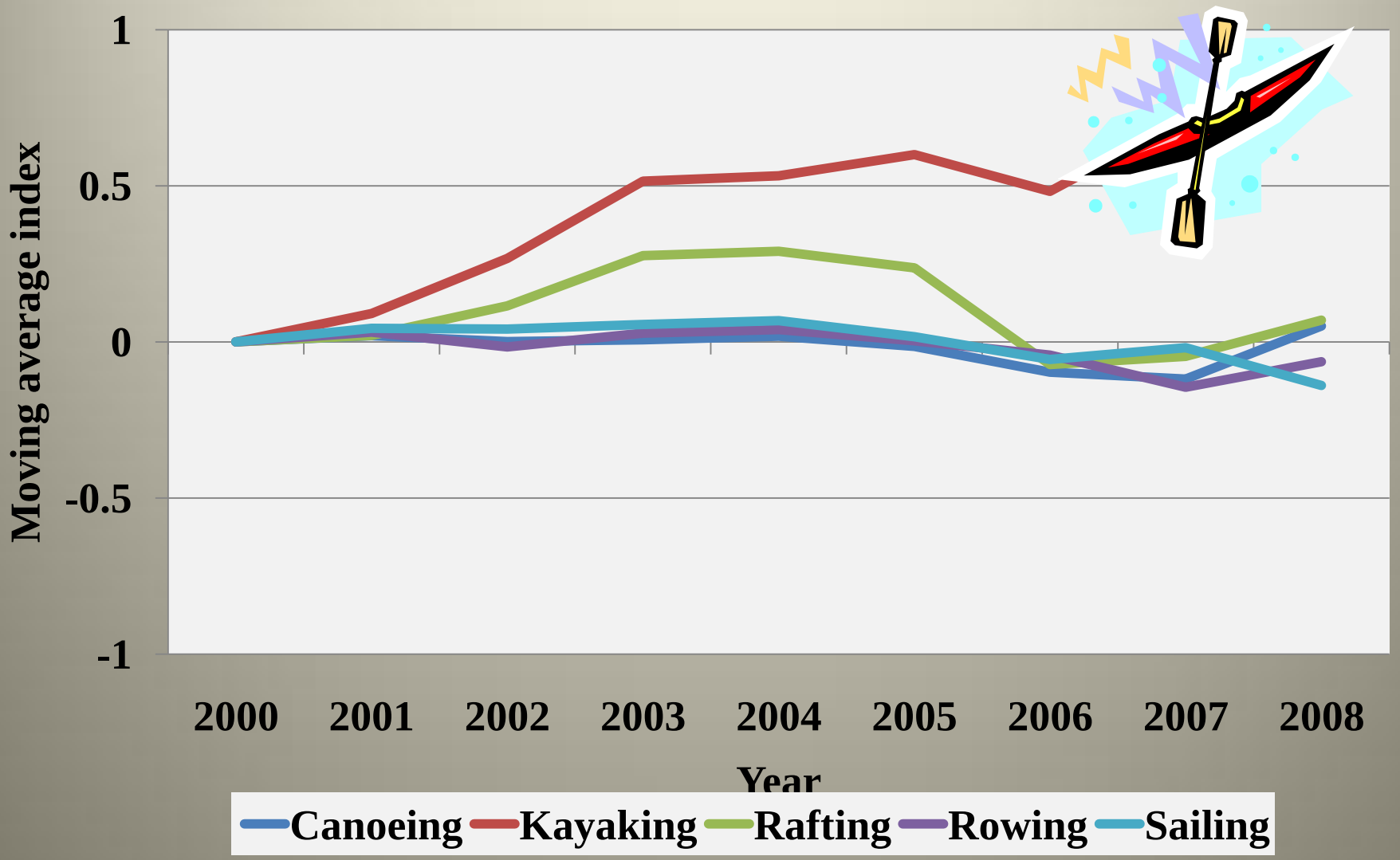




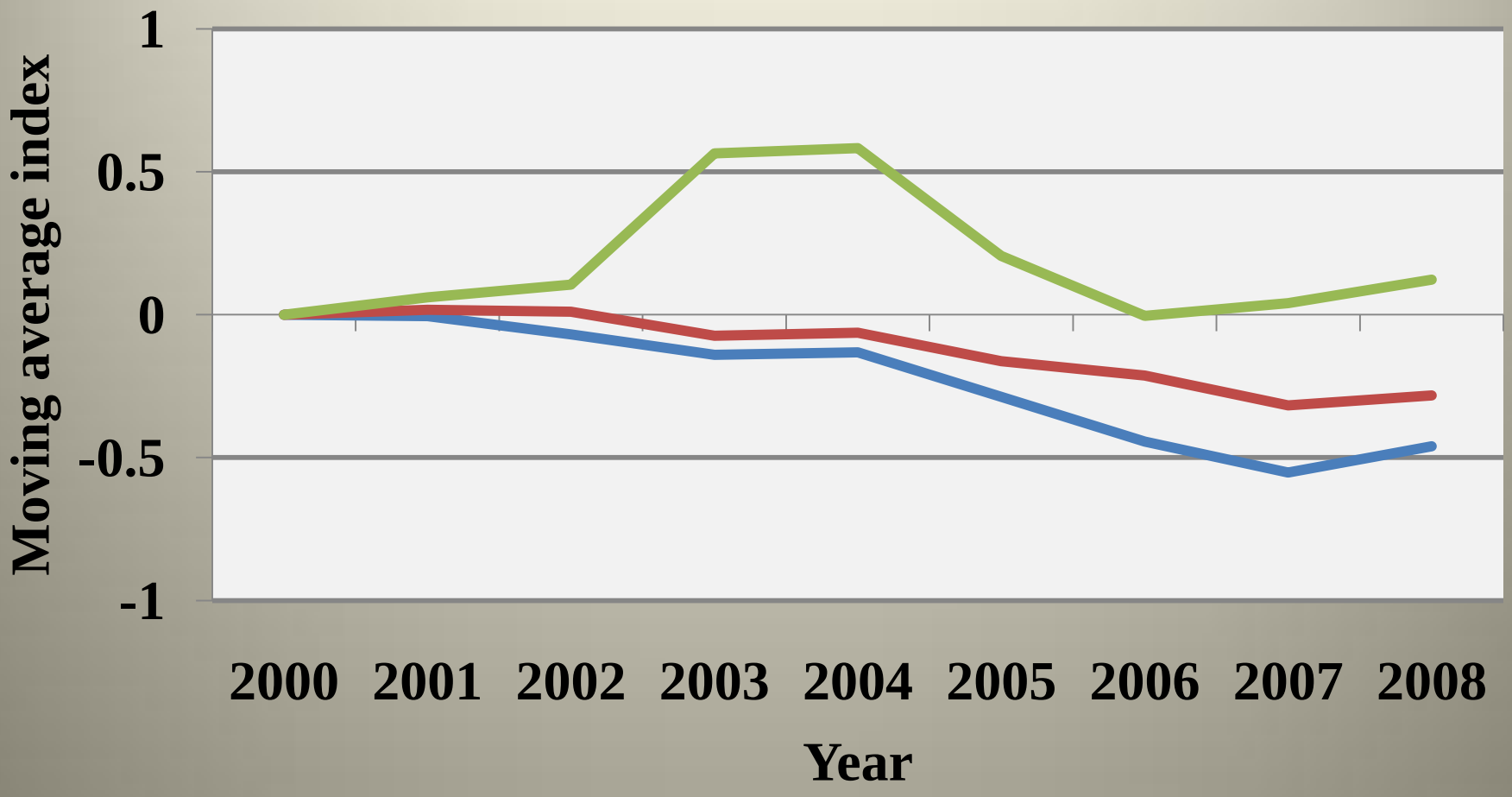
Indexed moving average of total activity days for activities associated with visiting recreation or historic sites 2000 to 2008



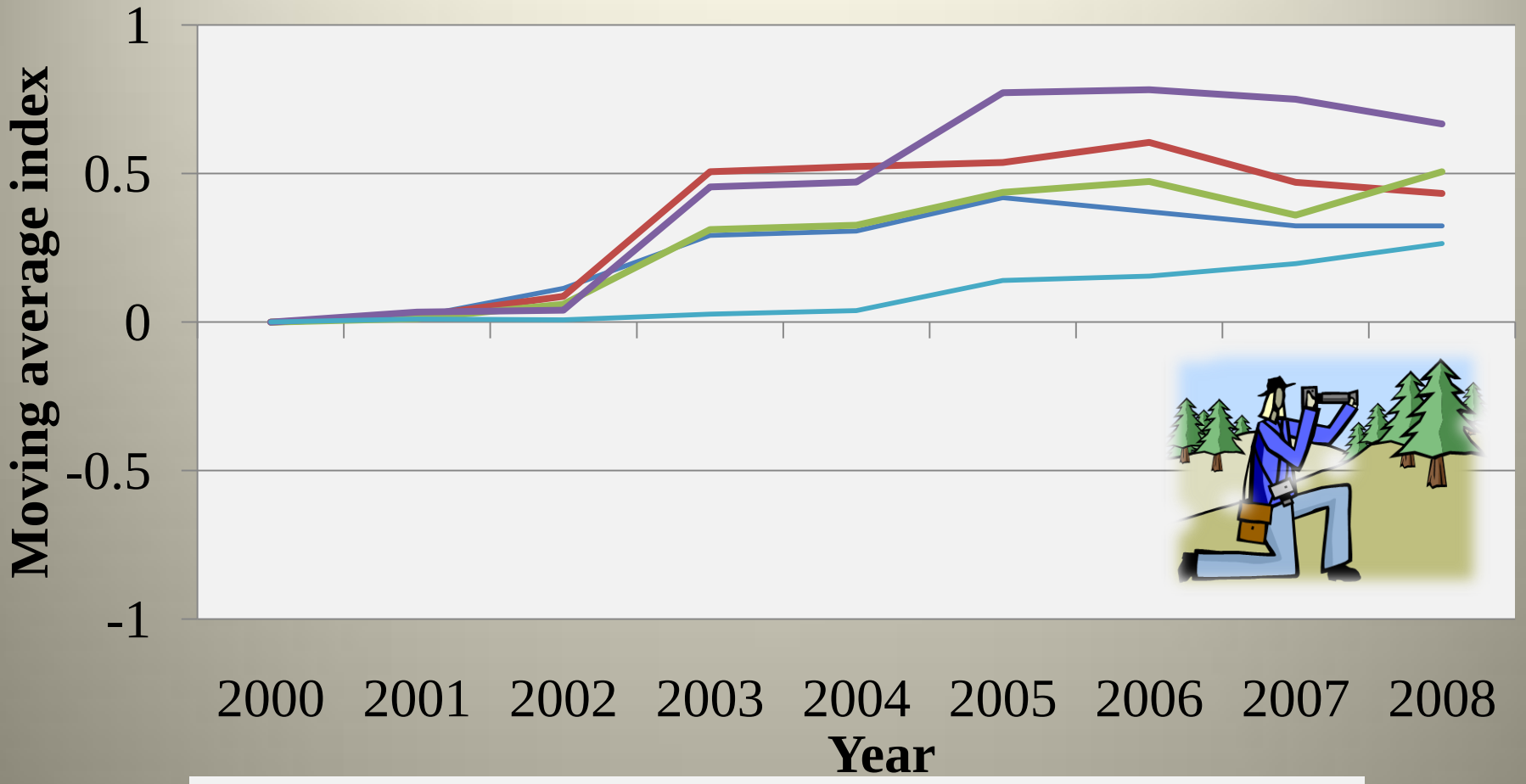
Indexed moving average of total activity days for non-motorized boating activities for year 2000 to 2008



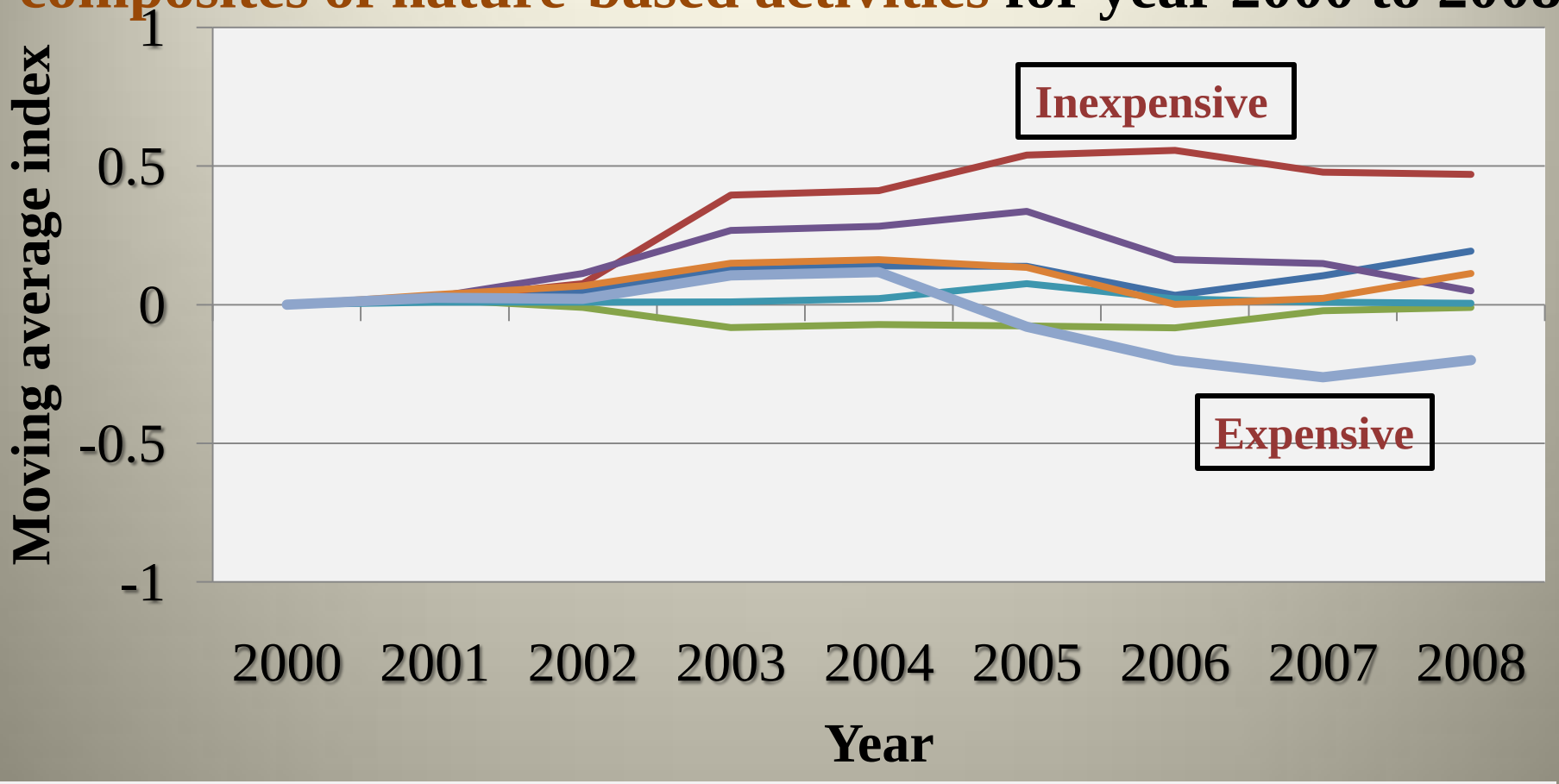
Indexed moving average of total activity days for snow skiing and boarding activities for year 2000 to 2008

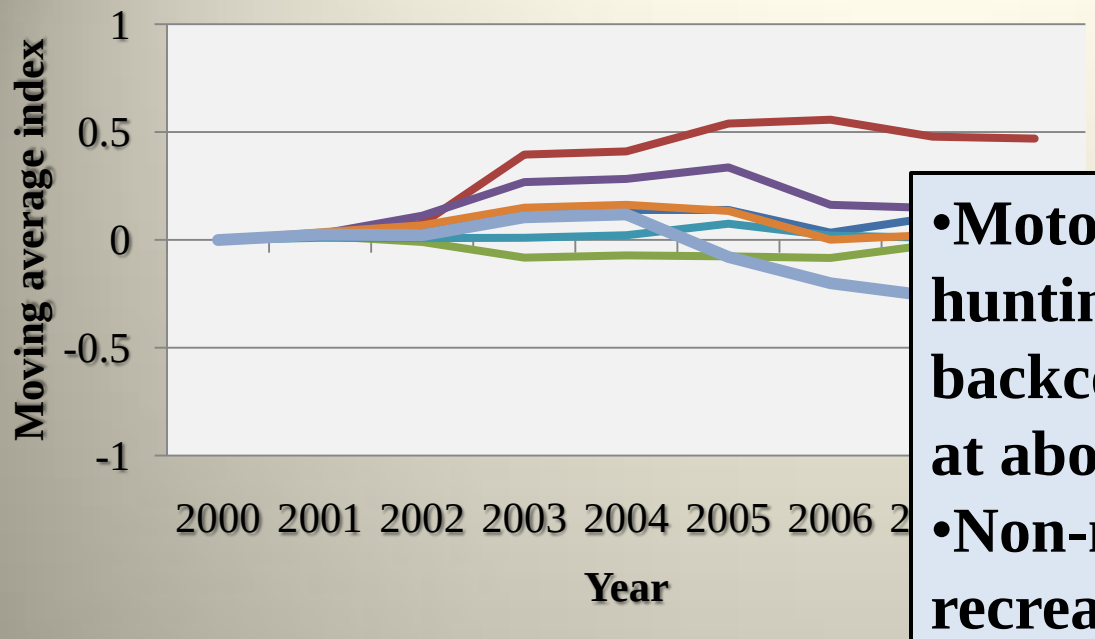


Indexed moving average of total activity days for viewing and photographing nature activities for year 2000 to 2008



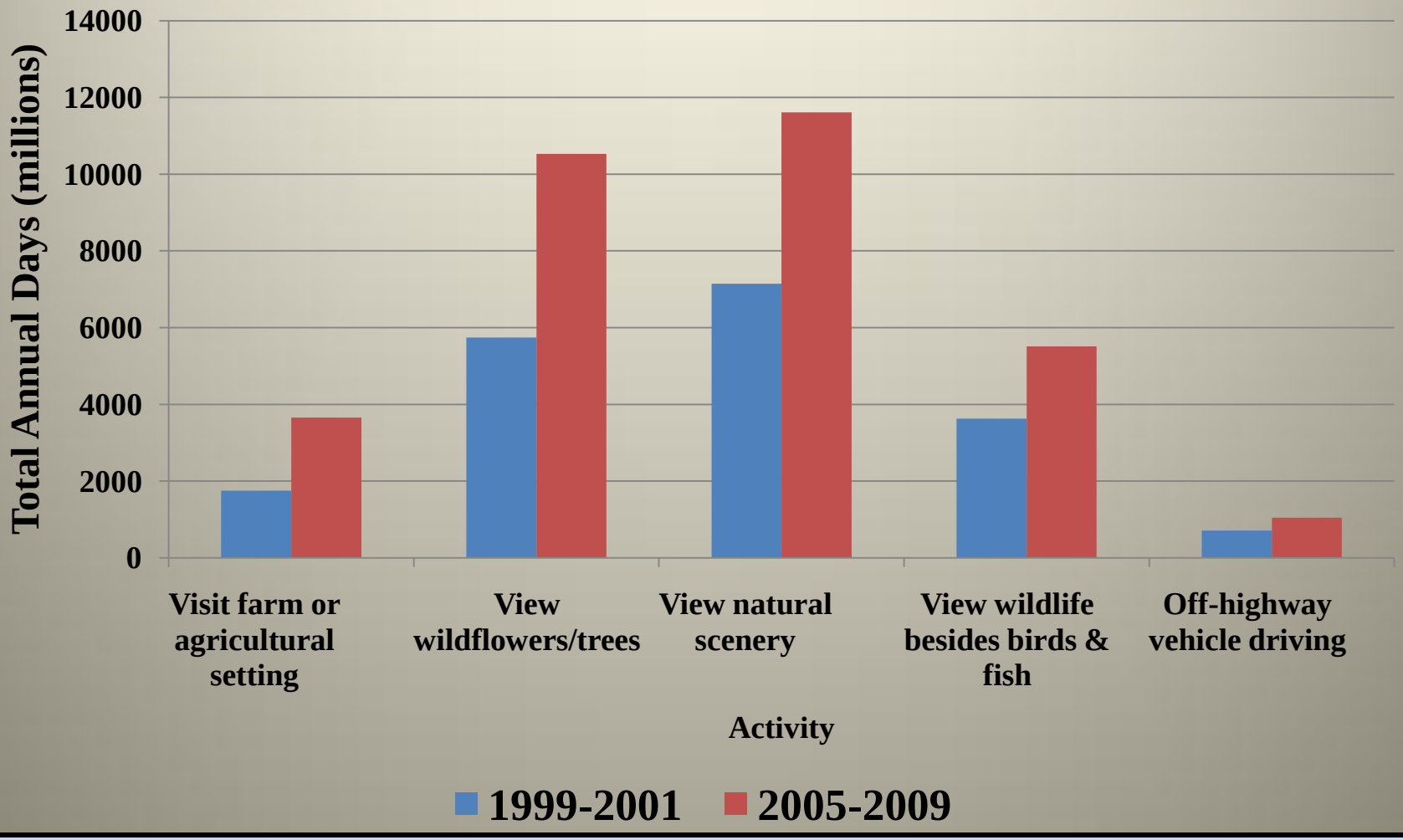
Indexed moving average of total activity days for seven composites of nature-based activities for year 2000 to 2008





- **Motorized activities, along with hunting, fishing, and backcountry activities, ended up at about the same level as 2000**
- **Non-motor boating and visiting recreation and historic sites grew modestly**
- **Various forms of skiing, including snowboarding, declined**
- **The clear leader was the overall group of activities named "viewing and photographing nature".**

Keeping numbers in perspective (NSRE)



Viewing natural scenery attracts 12 to 13 times the number of participation days as does OHV driving

Do Kids Spend Time Outdoors?

- What does research show about kids being outside, how much time outdoors?
- *Is there a trend?*
- What activities do youth prefer and participate in?
- What research is needed to help us understand kids outdoors and kids and nature?

National Kids Survey

National Kids Survey Results

Amount of time /day outside	Weekday	Weekend
None	2.3	3.8
Less than 1/2 hour a day	4.2	2.2
About 1/2 hour a day	8.1	3.5
About 1 hour	3.0	13.3
2-3 hours	33.9	27.4
4 or more hours	28.5	49.8

Source: National Kids Survey, NSRE 2007-2011. N=1,945.

Youth time trend on typical weekdays and weekend days during the past week by interview time period

Consistent results across three identical national surveys

Amount of time	Weekday			Weekend day		
	September '07 to July '08	August '08 to April '09	May '09 to February '11	September '07 to July '08	August '08 to April '09	May '09 to February '11
None	4.5	1.2	1.8	6.1	3.2	2.8
Less than 1/2 hour a day	5.2	4.3	3.3	1.9	2.3	2.2
About 1/2 hour a day	9.1	8.2	7.3	3.9	4.3	2.3
About 1 hour	18.5	26.4	23.0	12.7	11.7	15.3
2-3 hours	32.8	30.5	38.0	27.6	27.6	27.1
4 or more hours	29.9	29.5	26.6	47.7	50.8	50.3

Amount of time spent outdoors by youth on a typical WEEKEND DAY during the past week, by age and gender

Time	Age 6-9		Age 10-12		Age 13-15		Age 16-19	
	Male	Female	Male	Female	Male	Female	Male	Female
• < 1/2 hour	4.9	3.4	3.0	8.5	1.6	5.3	7.9	11.7
• ½ to 1 hour	12.5	12.4	12.8	15.1	12.0	20.0	25.0	23.9
• 2-3 hours	27.0	30.9	24.5	26.3	31.4	32.0	18.4	31.0
• 4 + hours	55.6	53.3	59.7	50.0	55.0	42.8	48.7	33.4

CHILDREN'S TIME OUTDOORS AND IN NATURE: A National and State Study

Current Research Partners:

National Wildlife Federation
The University of Tennessee
Texas AgriLife Extension Services (Texas A&M)
US Forest Service (Southern Research Station)

THE UNIVERSITY of TENNESSEE
HUMAN DIMENSIONS RESEARCH LAB

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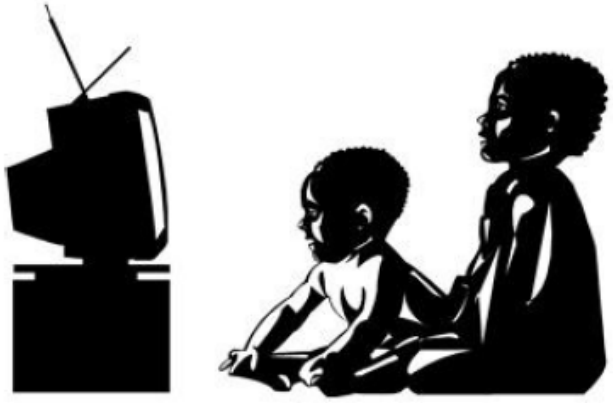
Trends in Children's Activities

- Steep decline in amount of time children are outdoors in natural settings.
- Increase in time spent on indoor-related activities including electronic media and games.
- Increase in serious physical and mental health issues in children.
- Loss of imagination, creativity, and innovation in the U.S.

Assumptions



Reality

- The actual trend in the amount of time kids spend outdoors and in nature is unclear.

- Very little scientific research has been conducted on kids' time and activities outdoors.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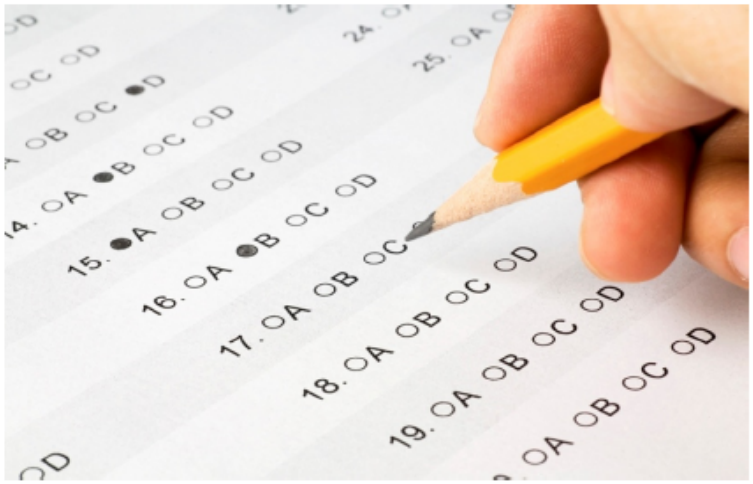
Research Objectives

- Time and activities in nature (Degree, extent, and type)
- Natural settings used (including access)
- Lifespan and adult influences
- Preferences and constraints
- Demographic characteristics (socio-economic, age, family structure, geographic area, etc.)



Outdoor Recreation Participation Summary

- Visitation to public lands varies by agency, some up, some down
- Overriding trends = very different activities now, growth of nature-based recreation, especially viewing and photographing nature.
- Different segments of society chose different types and levels of outdoor activities.
- There is evidence that America's youth do spend time outdoors and for some it is substantial.

•Public lands continue to be highly important due to the recreation opportunities they offer.

•What about Future Trends? Increases for some activities and declines for others?

National population projection---RPA forecasts

A Look to the Future…

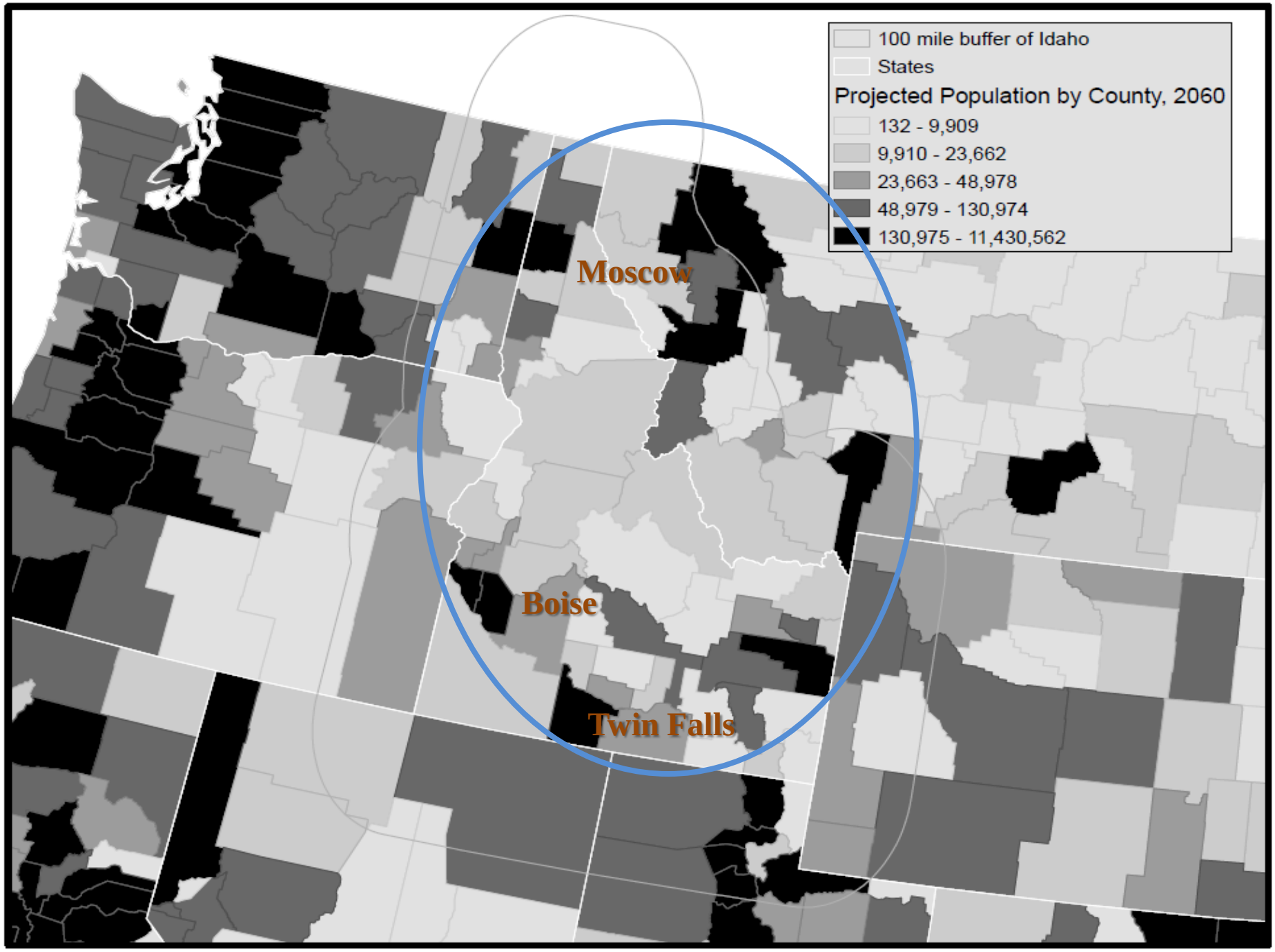
550
500
350
300
250

505
447
397

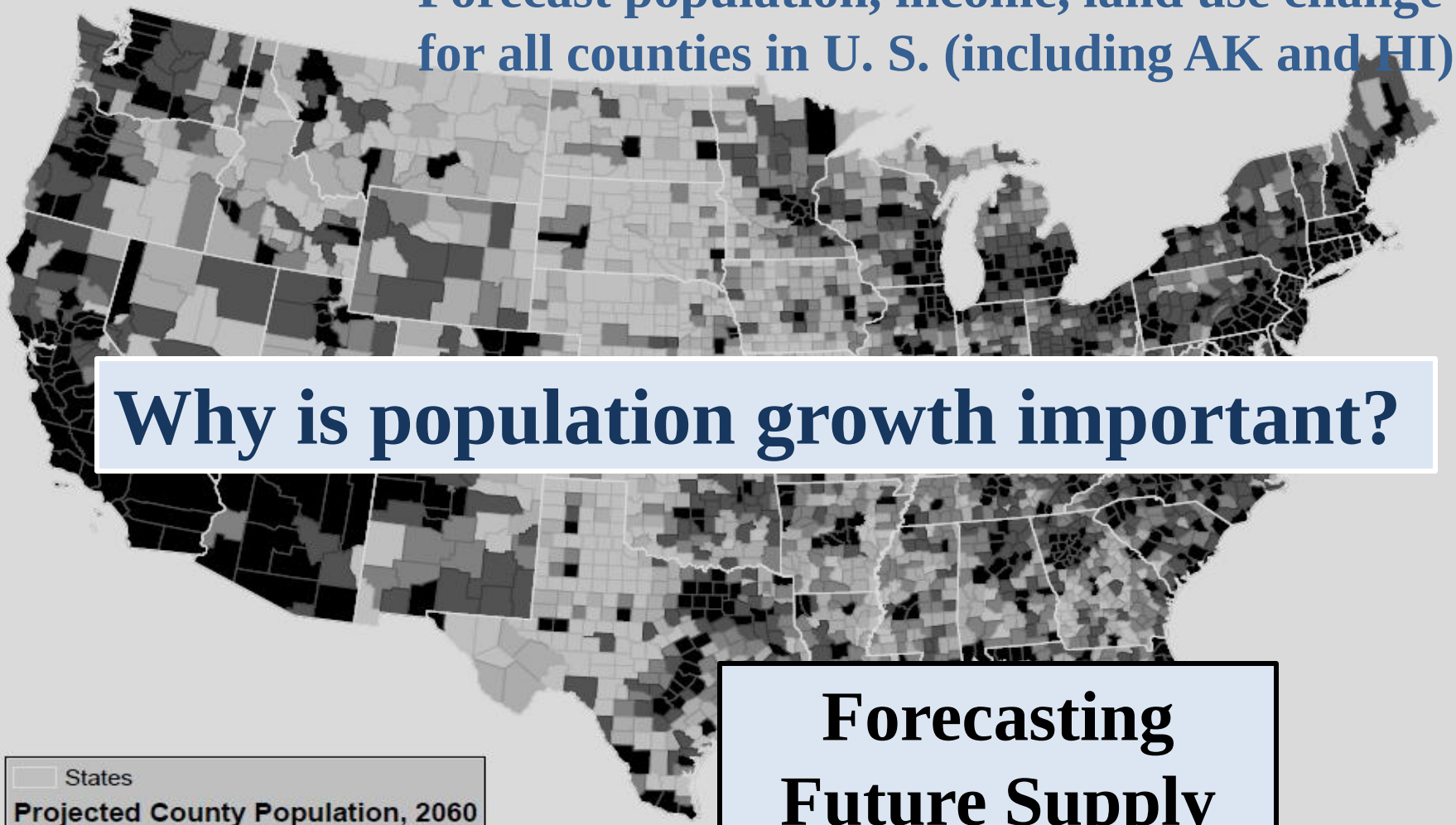
2000 2007 2010 2020 2030 2040 2050 2060

Year

A2 Scenario
A1/Census Scenario
B2 Scenario


100 mile buffer of Idaho
States
Projected Population by County, 2060
132 - 9,909
9,910 - 23,662
23,663 - 48,978
48,979 - 130,974
130,975 - 11,430,562
Moscow
Boise
Twin Falls

Forecast population, income, land use change for all counties in U. S. (including AK and HI)



Why is population growth important?

Forecasting Future Supply

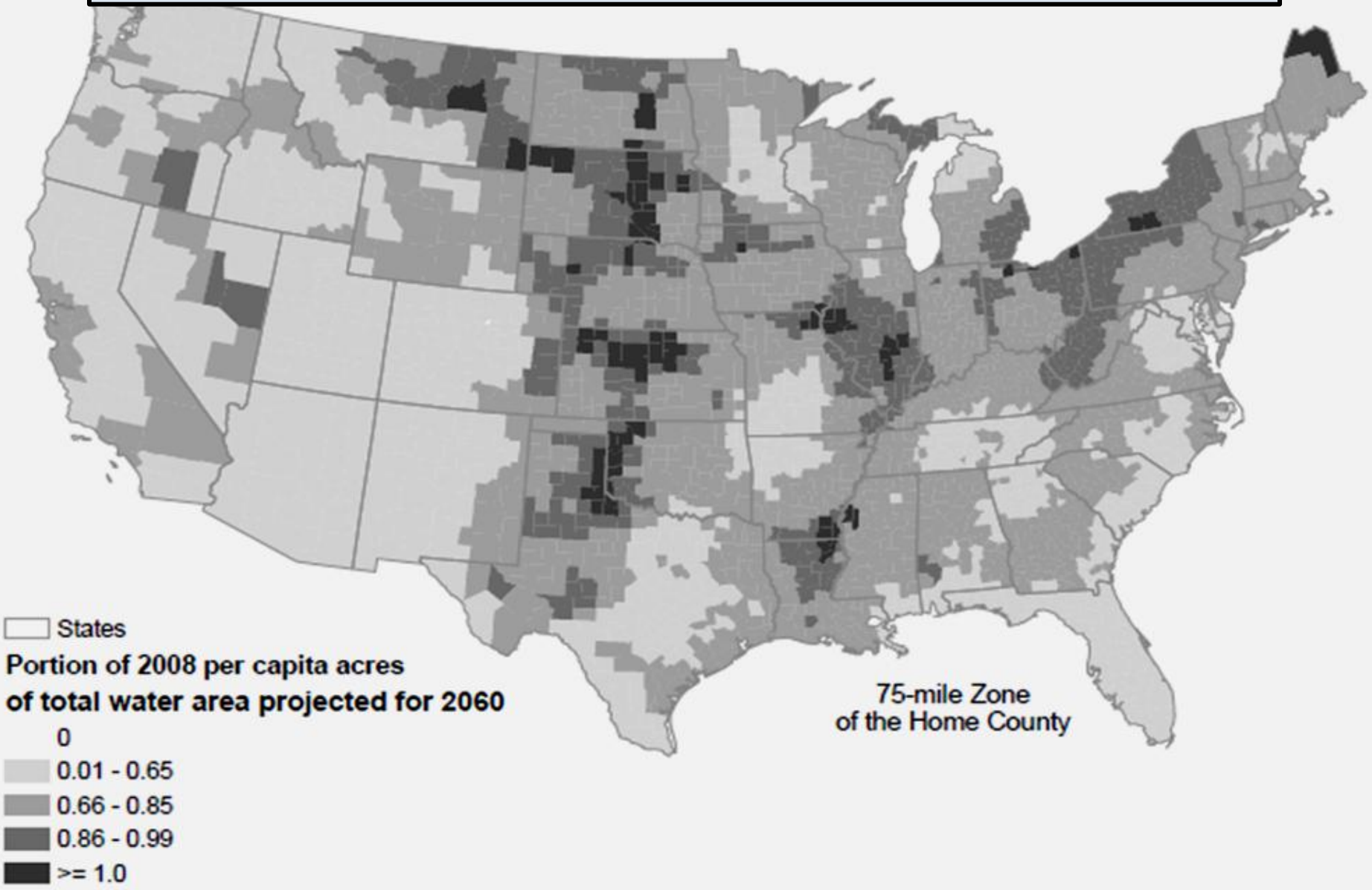
Nine basic resources that form the foundation for nature-based outdoor recreation and tourism:

- Federal and state park land
- Water
- Forest
- Open range and pasture
- Ocean and Great Lakes coast
- Mountains
- Snow cover
- Specially designated federal lands
- Private recreation businesses

Water area per capita 2060

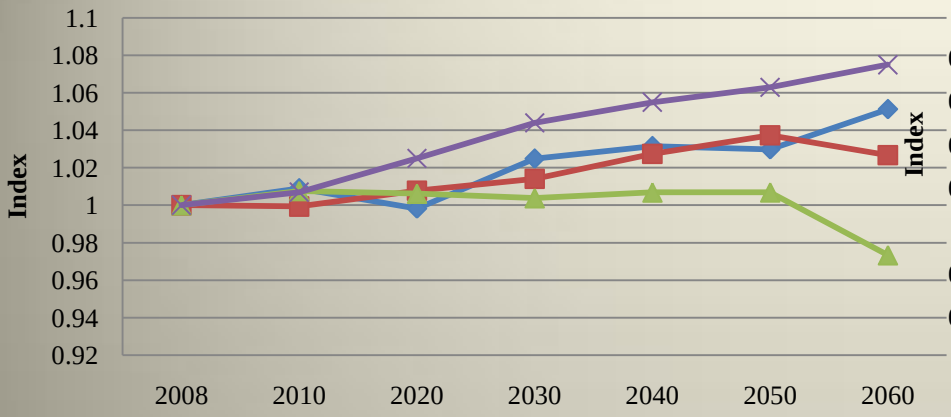
Sub-region & region	Water area			
	Total acres, 2008	Per capita acres, 2008	Projected per capita acres, 2060	Proportion of 2008 acres projected for 2060
Northeast	14,328.5	0.23	0.18	0.79
North Central	42,505.3	0.70	0.55	0.79
North Region	56,833.8	0.46	0.36	0.79
Southeast	15,068.8	0.30	0.18	0.60
South Central	14,213.4	0.27	0.18	0.66
South Region	29,282.1	0.28	0.18	0.63
Great Plains	2,495.3	0.41	0.32	0.76
Intermountain	**4,793.4**	**0.22**	**0.11**	**0.52**
Rocky Mountains Region	7,288.8	0.26	0.15	0.56
Alaska	58,442.2	85.54	50.43	0.59
Pacific Northwest	4,569.2	0.44	0.27	0.61
Pacific Southwest	7,836.5	0.21	0.13	0.65
Pacific Coast Region	70,848.0	1.44	0.93	0.64
U. S. Total	164,252.7	0.54	0.37	0.68

Water per capita forecast to 2060

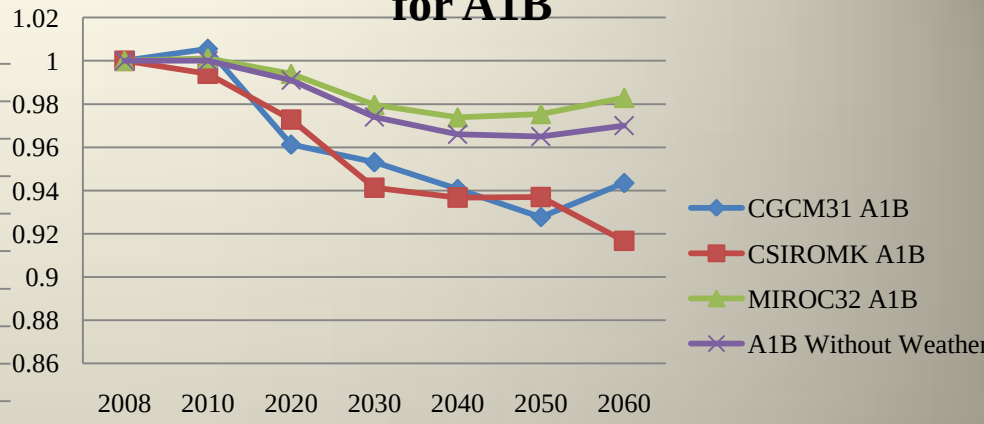


Forecasting Future Demand

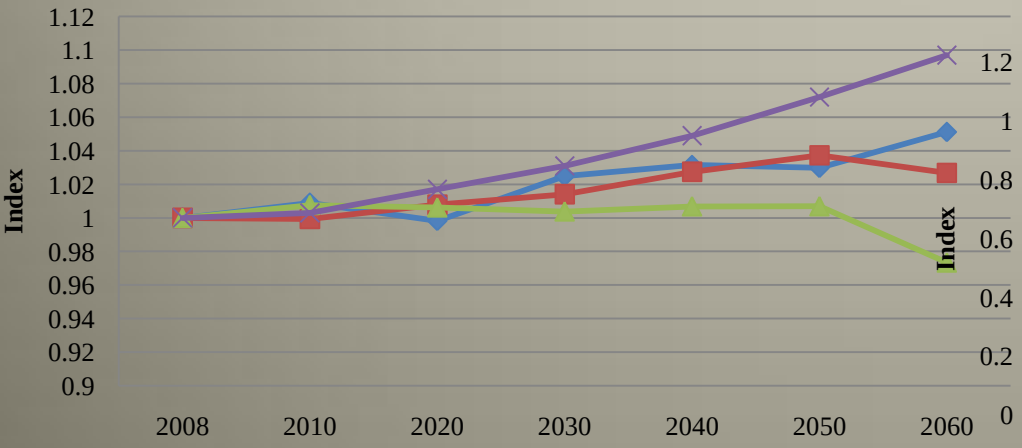
Indexed Per-Capita Participation in Birding : Comparison of Weather Models for A1B



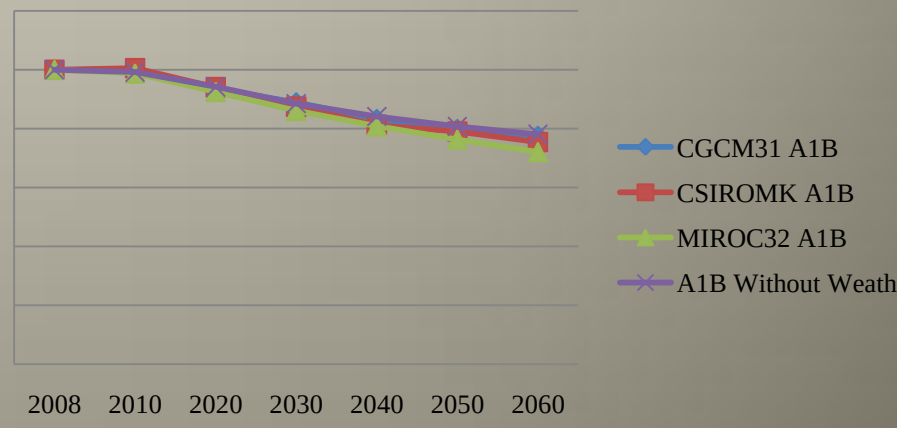
Indexed Per-Capita Participation in Fishing: Comparison of Weather Models for A1B



Indexed Per-Capita Participation in Hiking: Comparison of Weather Models for A1B



Indexed Per-Capita Participation in Hunting: Comparison of Weather Models for A1B



Forecast index of per-capita participation, 2060

- **Developed site use** **1.026**
- **Visiting interpretive site** **1.089**
- **Birding** **1.075**
- **Viewing nature** **1.035**
- **Challenge activities** **1.176**
- **Equestrian activities** **1.186**
- **Day hiking** **1.097**

Forecast index of per-capita participation, 2060

• Visiting primitive areas	0.995
• Motorized off-road activities	0.995
• Motorized water use	1.154
• Motorized snow use	1.026
• Hunting	0.781
• Fishing	0.970
• Developed skiing	1.570
• Undeveloped skiing	1.309
• Swimming	1.109
• Canoeing, kayaking, or rafting	1.031

Forecasting Rural Population Migration Trends and Patterns in the United States and Their Relationship to Natural Amenities

H. Ken Cordell
Vahé Heboyan
Florence Santos
John C. Bergstrom

- Results suggest a direct impact of changing natural amenities and climate change on rural population migration
- Data project population shift from Midwest
- Shift to Inter-Mountain and Pacific Northwest Regions, the Southern Appalachian and Ozark Mountains, and northern New England.

Average Effects of Natural Amenities on Rural Population Net Migration

1% increase in **cropland** will cause rural population to decrease by 230.

1 degree (Celsius) increase in average **summer temperature** will cause rural population to decrease by 299.

1 millimeter increase in average monthly **precipitation** will cause rural population to decrease by 2.

1% increase in percent **water area** will increase rural population by 603.

1% increase in **mountainous area** will increase rural population by 25.

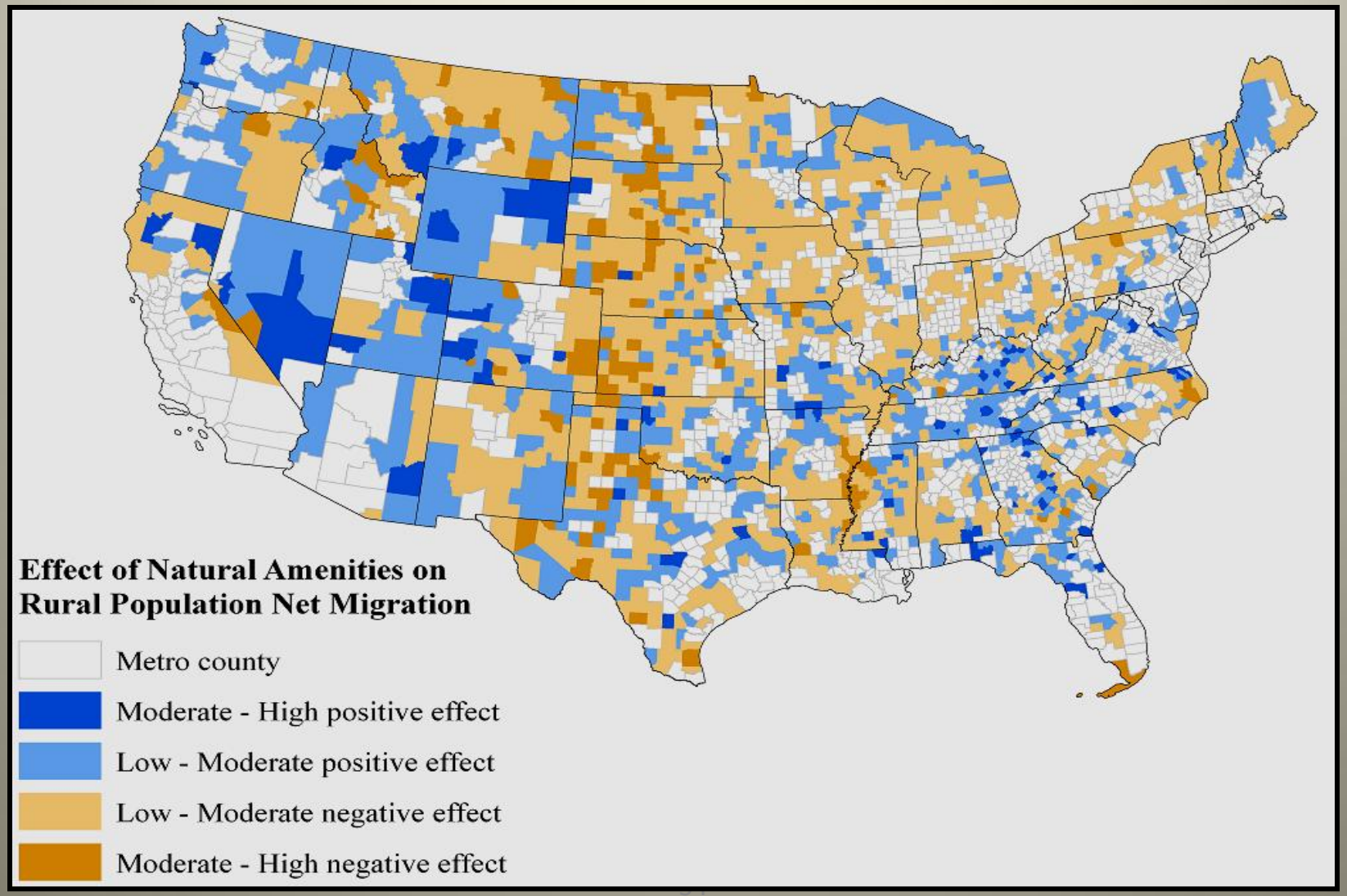
Coastal counties (compared to non-coastal counties) will in average experience an increase in rural population by 1,319.

1% increase in **wetland** area will cause rural population to decrease by 17.

Key Findings

- **People prefer rural areas with mild winters and cooler summers.**
- **Preference is for varied landscapes that feature a mix of forest land and open space.**
- **Effect of changes in natural amenities on rural population migration (2010-2060)**
  - **Positive effect**
    - **Inter-mountain and Pacific Northwest regions**
    - **Parts of the Southeastern, South Central, and Northeastern U.S.**
      - **e.g., Southern Appalachian Mountains, Ozark Mountains, northern New England.**
  - **Negative effects**
    - **Midwestern regions (e.g., Great Plains and North Central).**

Forecasted Effect of Natural Amenities on Rural Population Change, 2007-2020, 2010 RPA Climate Scenario A1B, Projection CGCM 3.1



Policy Implications of Amenity Migration Findings

- **Due to changing natural resources and climate, models suggest possible population gains in Inter-mountain and Pacific Northwest and Southern Appalachian Mountains, Ozark Mountains, northern New England. Midwest may lose population.**
- **Population gaining regions can capitalize on potential to attract upper-income migrants who have high values for natural amenities including favorable climate.**
- **Land management agencies and local governments should work to protect landscapes such as mix of forest land and open space valued by amenity migrants.**
- **Rising sea-levels under future global climate change projections may significantly alter the quantity and quality of water-related amenities (US Atlantic, Pacific, Gulf of Mexico, Great Lakes).**

Trend Summaries

- Population and demographics
- Visitation to public lands
- Outdoor recreation participation trends
- Kids time outdoors
- Forecasts of future outdoor recreation
- The draw of natural amenities and rural population growth

Summary---Population and Demographic Change

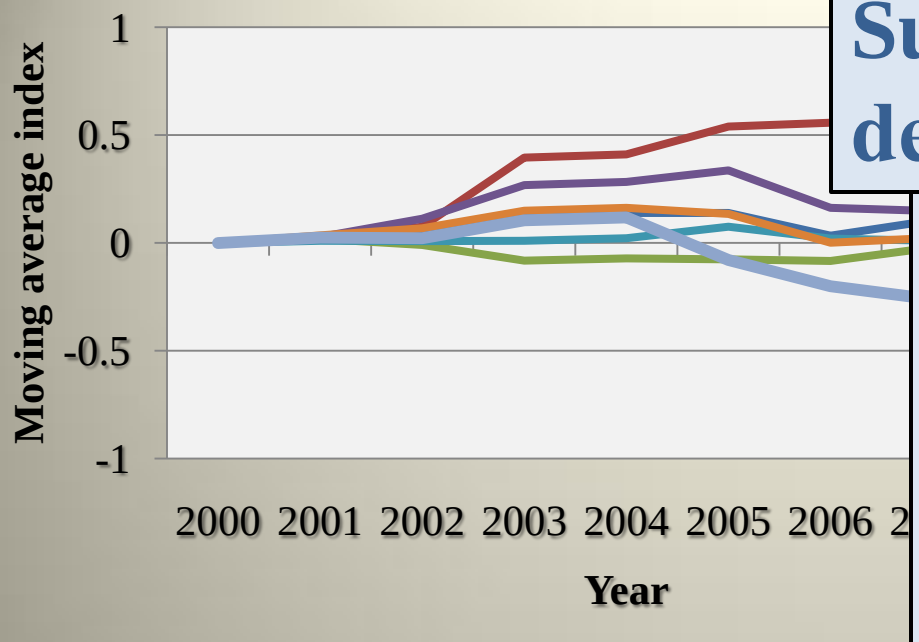
- Growth (population per square mile) has occurred almost everywhere, especially the Northeast coast, the Southern Appalachians, Atlanta, Chicago, Denver, Salt Lake City, the Southwest and Portland and Seattle
- The fastest growing age has been ages 44-54 and 55-64, with next fastest being 65 or older. There has been a decline in age group 25-34
- Growing especially fast is the Hispanic population in the Southeastern states, states bordering the Mississippi River, the upper Mid-West, Arizona, Utah, Wyoming, coastal Oregon and Washington, and Idaho

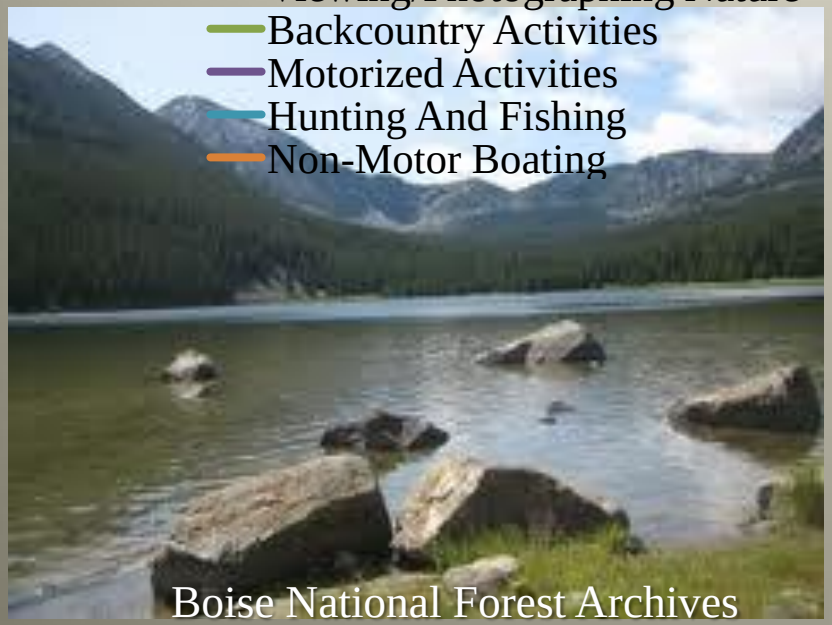
- **Changing population and its demographics affect outdoor recreation trends**

Summary, Public Land Visitation

- **National Park and Wildlife Refuge Visitation have wavered, but, relative to base year 1996, NP and WR visitation is up about 33 million per year**
- **Forest Service visitation estimates have shown declines**
- **State park visitation has also wavered over the last few years, but relative to 1992, it is up by over 14 million**

Summary of this decade's trends





- **Motorized activities, along with hunting, fishing, and backcountry activities, ended up at about the same level as 2000**
- **Non-motor boating and visiting recreation and historic sites grew modestly**
- **Various forms of skiing, including snowboarding, declined**
- **The clear leader was the overall group of activities named "viewing and photographing nature".**

Outdoor Recreation Participation Summary

- **Overriding trends = very different activities now, growth of nature-based recreation, especially viewing and photographing nature.**
- **Different segments of society chose different types and levels of outdoor activities.**
- **There is evidence that America's youth do spend time outdoors and for some it is substantial.**
- **Public lands continue to be highly important due to the recreation opportunities they offer.**

- **Visitation to public lands varies by agency, some up, some down**
- **What about Future Trends? Increases for some activities and declines for others?**

Forecast Summary---Participation Rate

- **Five outdoor recreation activities are projected for fastest growth in per capita participation:**
  - **Developed skiing (20 to 50 percent)**
  - **Undeveloped skiing (9 to 31 percent)**
  - **Challenge activities (6 to 18 percent increase)**
  - **Equestrian activities (3 to 19 percent)**
  - **Motorized water activities (-3 to 15 percent).**

- **A number of activities are projected to decline:**
  - **Visiting primitive areas (0 to -5 percent)**
  - **Motorized off-road activities (0 to -18 percent)**
  - **Motorized snow activities (2 to -11 percent)**
  - **Hunting (-22 to -31 percent)**
  - **Fishing (-3 to -10 percent)**
  - **Floating activities (3 to -11 percent).**

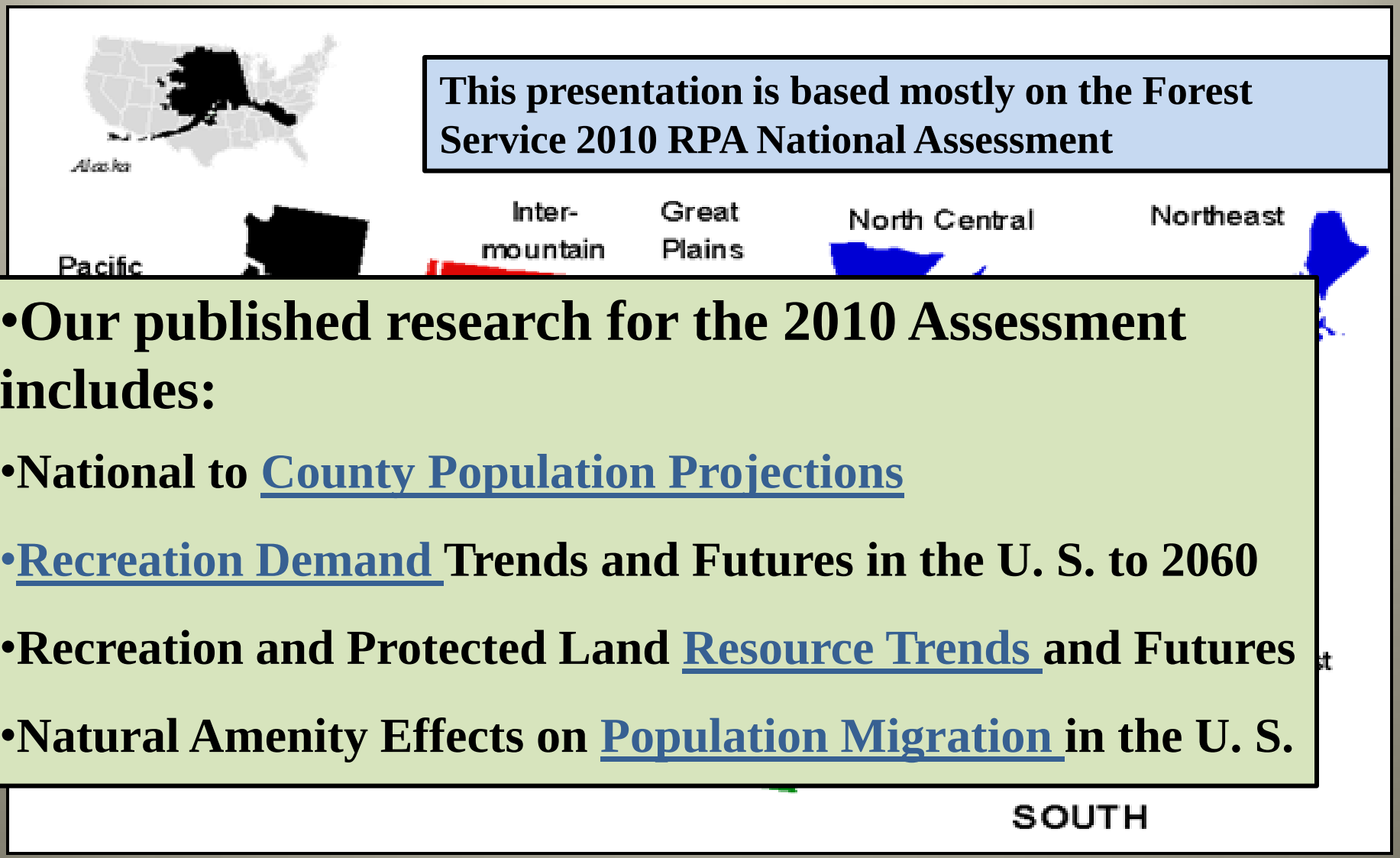
- **Growth of per capita participation rates for the remaining activities will hover around zero or grow minimally**

Summary, Natural Amenity Migration

- **People prefer rural areas with mild winters and cooler summers.**
- **Preference is for varied landscapes that feature a mix of forest land and open space.**
- **Effect of changes in natural amenities on rural population migration (2010-2060)**
  - **Positive effect**
    - **Inter-mountain and Pacific Northwest regions**
    - **Parts of the Southeastern, South Central, and Northeastern U.S.**
      - **e.g., Southern Appalachian Mountains, Ozark Mountains, northern New England.**
  - **Negative effects**
    - **Midwestern regions (e.g., Great Plains and North Central).**

- How public lands are used for recreation may well change over the next 50 years.
  - Access for activities such as snow skiing, rock climbing, and horseback riding may rise in importance relative to other activities.
  - Access for off-road and snowmobile driving, hunting, and fishing may decline in relative importance.
- What is clear is that people in Idaho and elsewhere appreciate nature and desire to experience it in many ways.
- For Idaho, we recommend careful study of our findings with consideration of the state's particular social, economic and natural resource situation.
- The challenge for Idaho, for other states, and for land managers will be to maintain the integrity of natural places to the maximum extent possible.

Forest Service RPA Regions of the U. S.



This presentation is based mostly on the Forest Service 2010 RPA National Assessment

- **Our published research for the 2010 Assessment includes:**
- **National to County Population Projections**
- **Recreation Demand Trends and Futures in the U. S. to 2060**
- **Recreation and Protected Land Resource Trends and Futures**
- **Natural Amenity Effects on Population Migration in the U. S.**

End

Model and Method

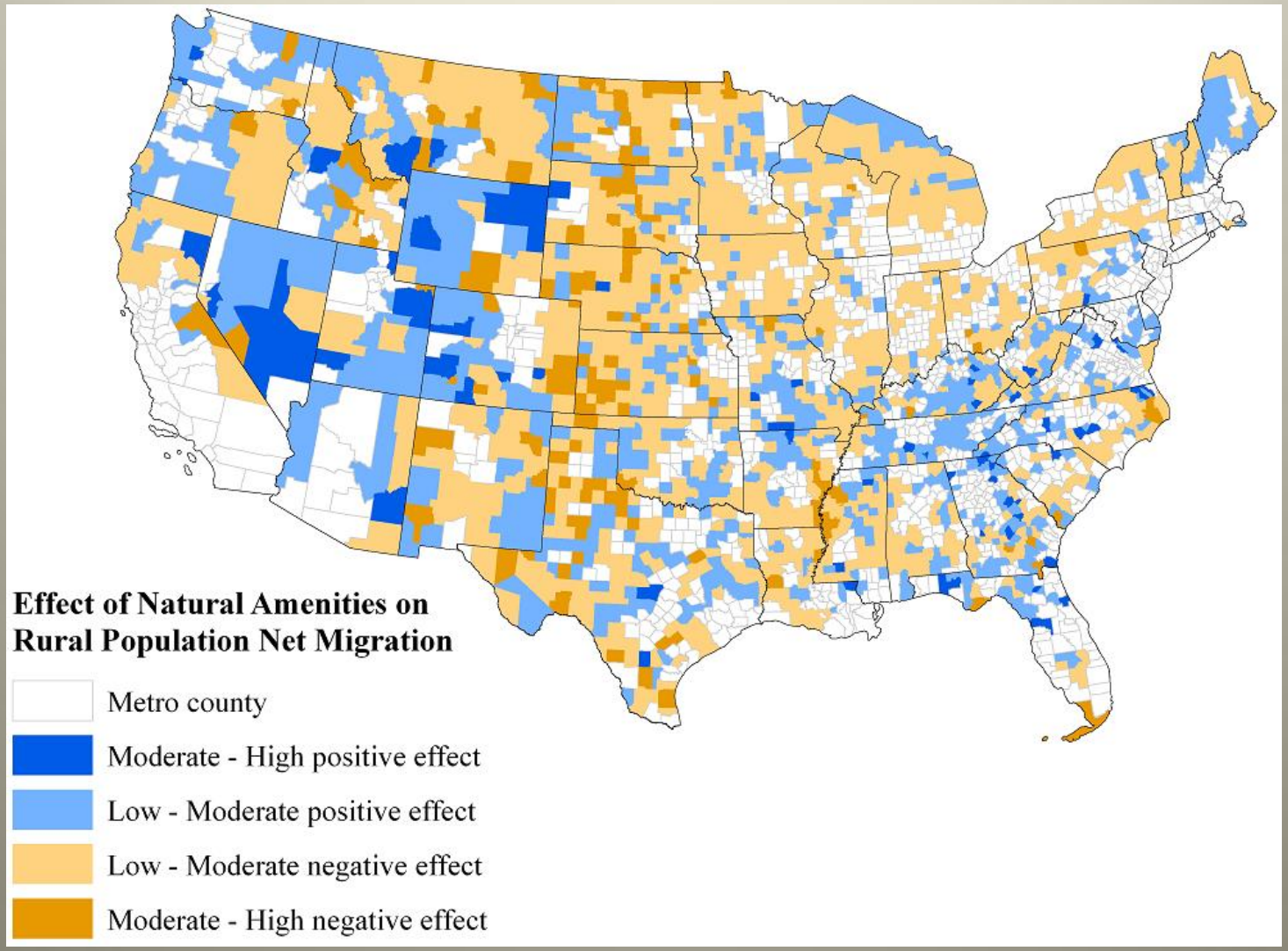
$$RInternalMig = \alpha_0 + \beta_1 pcemp_{it} + \beta_2 meansummr_{it-1} + \beta_3 ppt_{it-1} + \beta_4 pcrop_{it-1} + \beta_5 pcrop^2_{it-1} + \beta_6 lnpcy_{it-1} + \eta_1 meanwintr_{it-1} + \eta_2 pforest_{it-1} + \eta_3 pforest^2_{it-1} + \eta_4 ppasture_{it-1} + \eta_5 ppasture^2_{it-1} + \eta_6 prange_{it-1} + \eta_7 prange^2_{it-1} + \eta_8 lnpcfd100_i + \eta_9 lnpwater_i + \eta_{10} percmount_i + \eta_{11} coast_i + \eta_{12} snowmed_i + \eta_{13} pwetland_i + \eta_{14} lnpd_{it-1} + \eta_{15} lnpd^2_{it-1} + \eta_{16} TER_i + c_i + \varepsilon_{it}$$

- **Method:** Fixed Effects Vector Decomposition (FEVD) econometric estimation method
  - Based on Plümper and Troeger, 2007 technique for estimating time invariant and rarely changing variables.
  - Estimated model is used to assess static effects of natural amenities on rural migration, and project effects of changes in natural amenities on rural population migration rates to 2060.

Model Variable Definitions

- **Independent variables** *(continued)*:
  - **wetland**, %, lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water.
  - Per capita **federal designated land** within a 100 mile radius.
  - **water area**, %.
  - **mountainous area**, %.
  - **coastal county** indicator, 1 if adjacent to coast, 0 otherwise.
  - employment (% change).
  - **population density**, is expressed as "people per square mile" of land area.
  - **income**, average annual real per capita income.
  - **TER**, property tax and government expenditure ratio.

Forecasted Effect of Natural Amenities on Rural Population Change, 2007-2060, 2010 RPA Climate Scenario A1B, Projection CGCM 3.1



Data

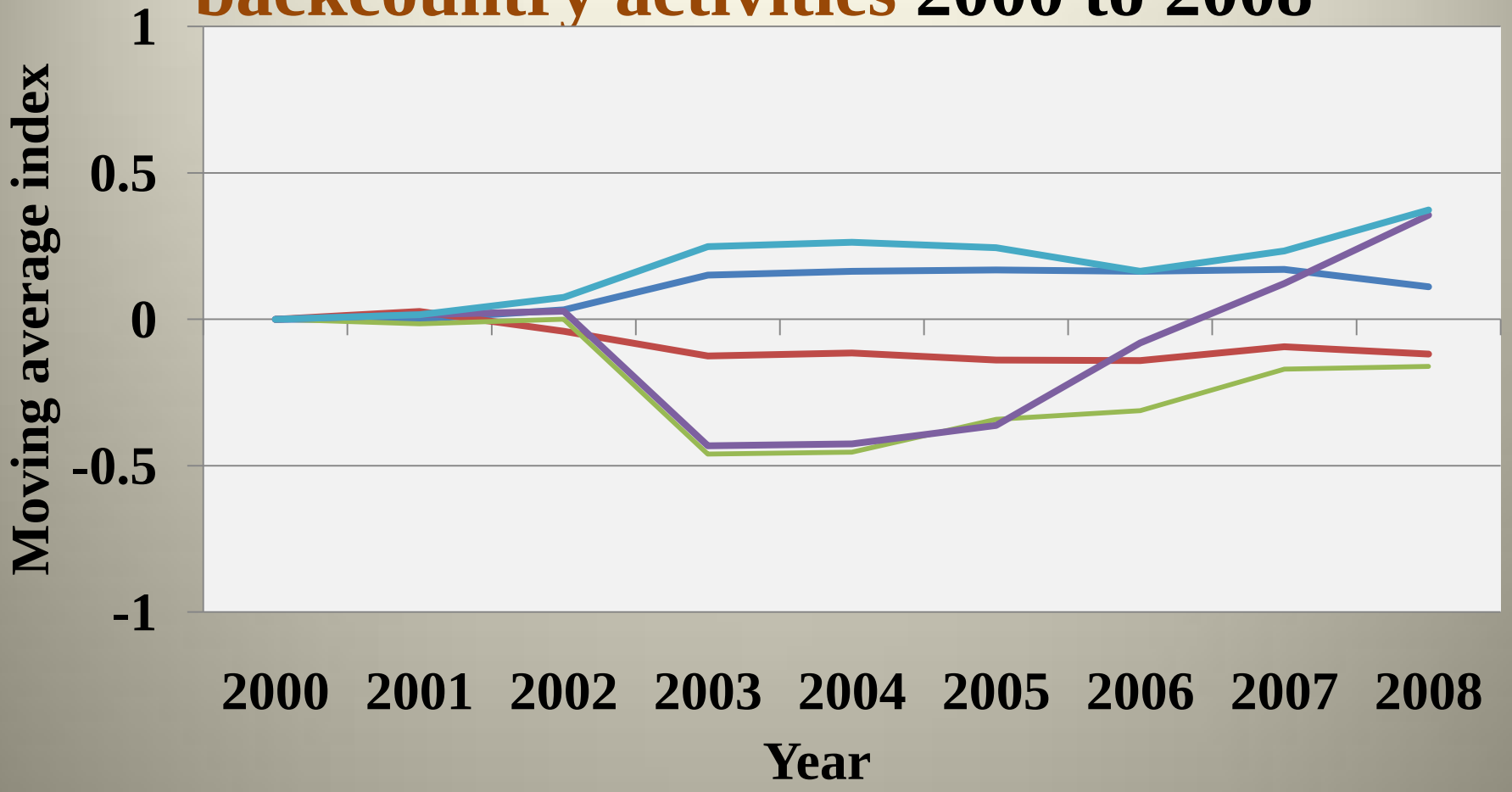
- Annual data for 2,014 rural counties
  - 1990-2007
- **Source**:
  - U.S. Census
  - USDA Forest Service (RPA Assessment Climate Data 2007)
  - National Climate Data Center (NCDC)
  - NRCS National Resources Inventory (NRI)
  - Bureau of Economic Analysis Regional Economic Information System (BEA REIS)
  - Bailey's eco-region

Model Variable Definitions

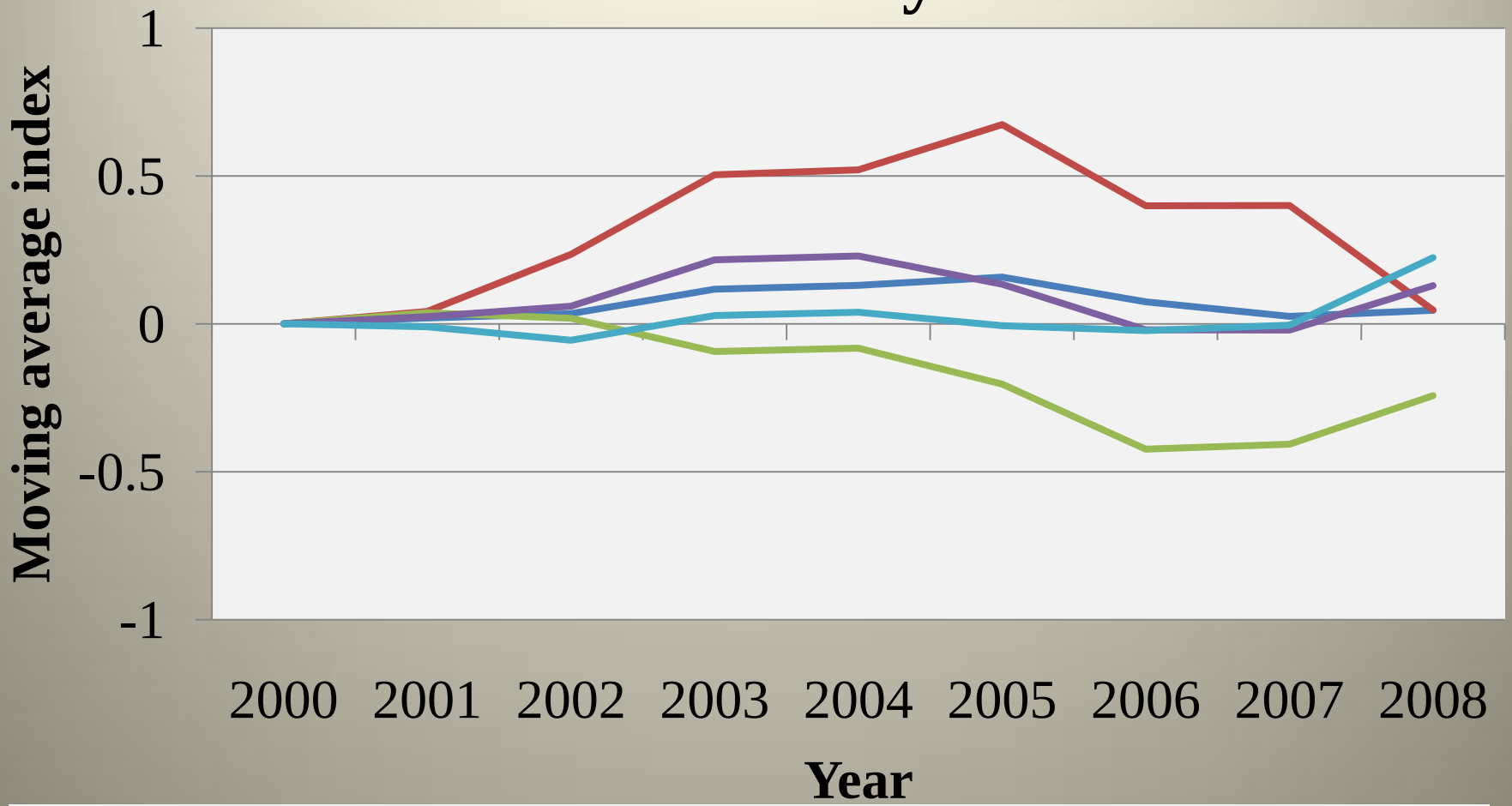
- **Dependent variable:**
  - **Net migration rate** (the difference between domestic in-migration to the area and out-migration from the same area during a time period.

- **Independent variables**:
  - summer & winter **temperature** (mean monthly, June, July, August, °C).
  - **precipitation**, mean monthly (*mm*).
  - **snowfall**, average number of days with >= 1 inch (per station).
  - **cropland** (%, includes areas used for the production of adapted crops for harvest).
  - **forest land** (%, land cover that is at least 10 percent stocked by single-stemmed woody species of any size that will be at least 4 meters (13 feet) tall at maturity).
  - **pasture land** (%, land managed primarily for the production of introduced forage plants for livestock grazing).
  - **range land** (%, land cover category on which the potential plant cover is composed principally of native grasses, grasslike plants, forbs or shrubs suitable for grazing and browsing, and introduced forage species that are managed like rangeland).

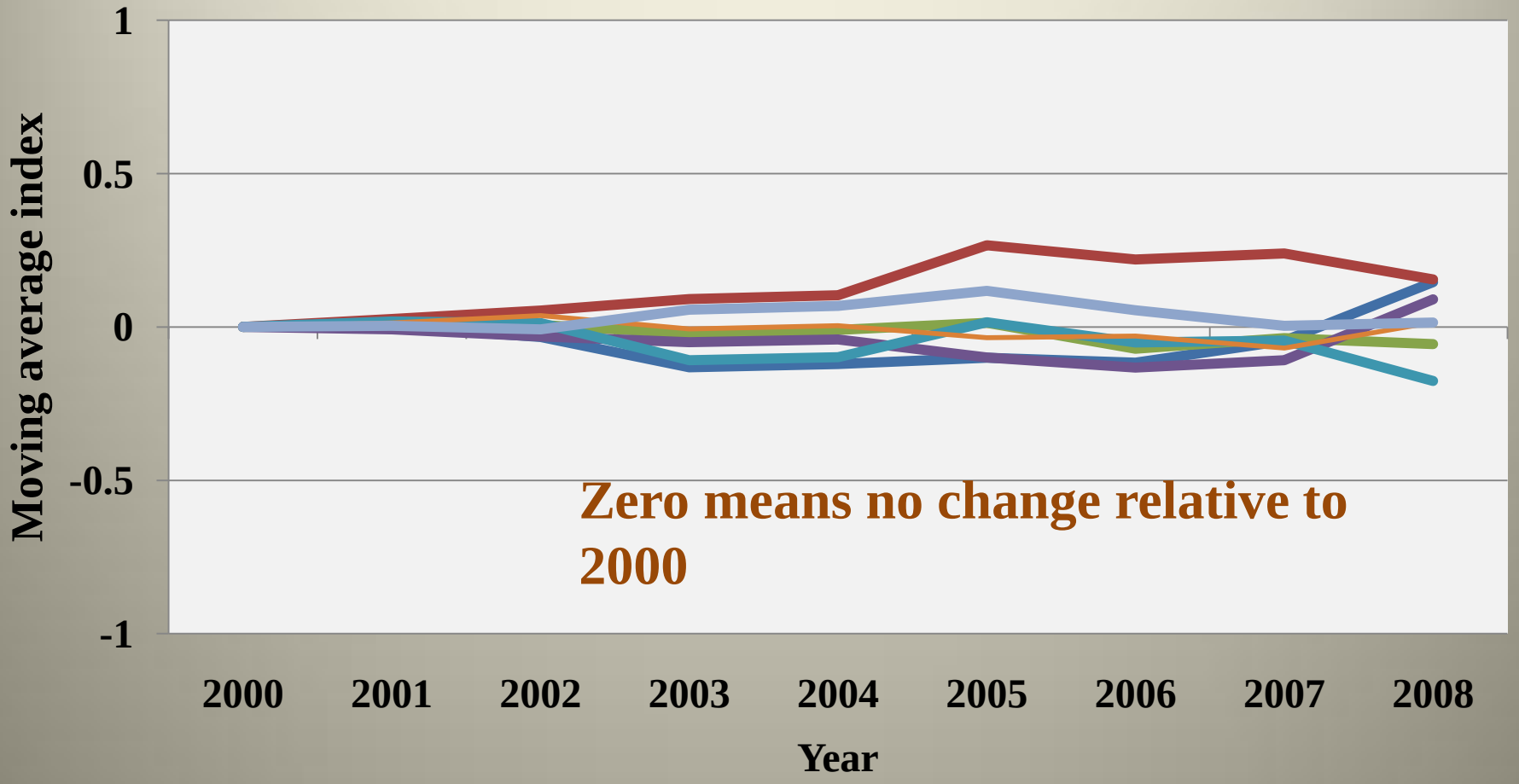
Indexed moving average of total activity days for backcountry activities 2000 to 2008



Indexed moving average of total activity days for motorized activities for year 2000 to 2008



Indexed moving average of total activity days for hunting and fishing activities for year 2000 to 2008



Different Segments Chose Different Outdoor Activities

- **Visiting recreation or historic sites higher among non-Hispanic Whites, late teenagers, middle-aged people, people with college, higher income people, and foreign born.**
- **Viewing and photographing nature higher among higher education, higher incomes, non-Hispanic Whites, people 35 to 54, with college, and earning more than $50,000**
- **Backcountry activities highest among males, Whites, Native Americans, people under 55, well-educated, higher incomes, and rural residents**
- **Hunting, fishing and motorized outdoor activities was higher among rural, non-Hispanic White males, middle-to-high incomes**
- **Non-motorized boating activities and skiing/snowboarding participation tended to be greater for younger, non-Hispanic White urban males with higher incomes and education levels.**

Average Effects of Natural Amenities on Rural Population Net Migration

1 unit increase in per capita **federal designated land** area will cause rural population to increase by 360.

1 unit increase in average number of days with **snowfall** ≥ 1 inch will cause rural population to increase by 59.

1 degree (Celsius) increase in average **winter temperature** will cause rural population to increase by 110.

1% increase in **range land** will cause rural population to increase by 67.

1% increase in **forest land** will cause rural population to increase by 215.

1% increase in **pasture land** will increase rural population by 148.